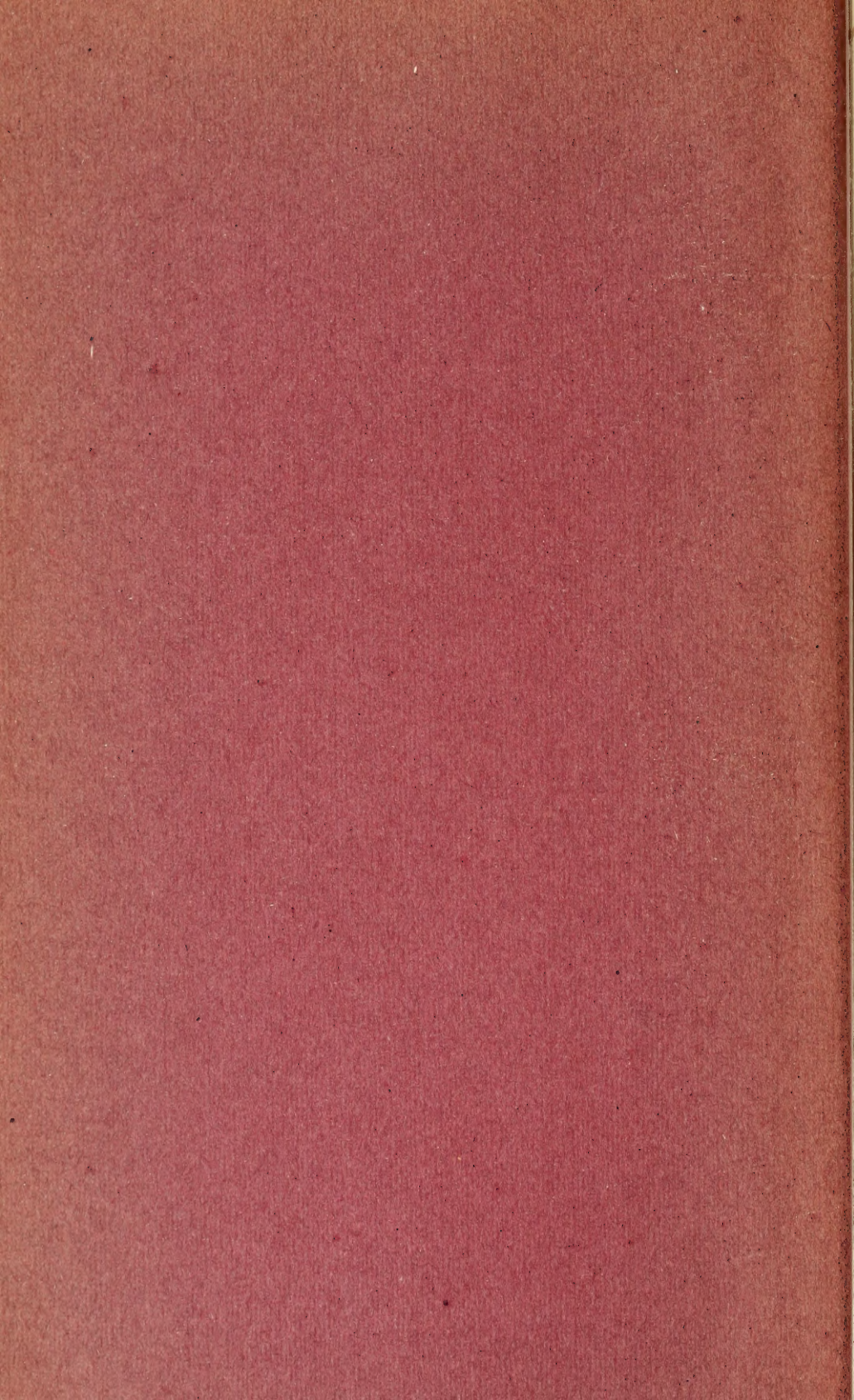




Presented to
The Library
of the
University of Toronto
by

Academy of Medicine



CONTRIBUTORS TO VOLUME I

1911

CRANDALL, FLOYD M., M.D.

DUEL, ARTHUR B., M.D.

FRAZIER, CHARLES H., M.D.

KYLE, D. BRADEN, M.D.

RUHRÄH, JOHN, M.D.

PUBLISHED QUARTERLY

BY

LEA & FEBIGER

708 Sansom Street

Philadelphia

Med.
P

Awarded Grand Prize, Paris Exposition, 1900

PROGRESSIVE MEDICINE

A QUARTERLY DIGEST OF ADVANCES, DISCOVERIES
AND IMPROVEMENTS

IN THE

MEDICAL AND SURGICAL SCIENCES

EDITED BY

HOBART AMORY HARE, M.D.

PROFESSOR OF THERAPEUTICS AND MATERIA MEDICA IN THE JEFFERSON MEDICAL COLLEGE OF PHILADELPHIA; PHYSICIAN TO THE JEFFERSON MEDICAL COLLEGE HOSPITAL; ONE TIME CLINICAL PROFESSOR OF DISEASES OF CHILDREN IN THE UNIVERSITY OF PENNSYLVANIA;
MEMBER OF THE ASSOCIATION OF AMERICAN PHYSICIANS, ETC.

ASSISTED BY

LEIGHTON F. APPLEMAN, M.D.

INSTRUCTOR IN THERAPEUTICS, JEFFERSON MEDICAL COLLEGE, PHILADELPHIA; OPHTHALMOLOGIST TO THE FREDERICK DOUGLASS MEMORIAL HOSPITAL; INSTRUCTOR IN OPHTHALMOLOGY, PHILADELPHIA POLYCLINIC HOSPITAL AND COLLEGE FOR GRADUATES IN MEDICINE.

VOLUME I. MARCH, 1911

SURGERY OF THE HEAD, NECK, AND THORAX—INFECTIOUS DISEASES, INCLUDING
ACUTE RHEUMATISM, CROUPOUS PNEUMONIA, AND INFLUENZA
—DISEASES OF CHILDREN—RHINOLOGY AND
LARYNGOLOGY—OTOLOGY




247751
22.10.30

LEA & FEBIGER

PHILADELPHIA AND NEW YORK

1911



Entered according to the Act of Congress, in the year 1911, by

LEA & FEBIGER

in the Office of the Librarian of Congress. All rights reserved.

LIST OF CONTRIBUTORS

JOSEPH C. BLOODGOOD, M.D.,

Associate Professor of Surgery, Johns Hopkins University, Baltimore, Md.

C. W. BONNEY, M.D.,

Assistant Demonstrator of Anatomy at the Jefferson Medical College, Philadelphia.

JOHN ROSE BRADFORD, M.D., F.R.C.P., F.R.S.,

Professor of Medicine in University College and Physician to the University College Hospital, London.

JOHN G. CLARK, M.D.,

Professor of Gynecology in the University of Pennsylvania, Philadelphia.

WILLIAM B. COLEY, M.D.,

Attending Surgeon to the General Memorial Hospital; Associate Surgeon to the Hospital for Ruptured and Crippled; Clinical Lecturer in Surgery and Instructor in Surgery at the College of Physicians and Surgeons, Columbia University, New York.

FLOYD M. CRANDALL, M.D.,

Consulting Physician to the Infants' and Children's Hospital; Late Visiting Physician to Minturn Hospital, New York.

EDWARD P. DAVIS, M.D.,

Professor of Obstetrics in the Jefferson Medical College of Philadelphia.

ARTHUR B. DUEL, M.D.,

Professor of Otolology, New York Polyclinic Medical School and Hospital; Aural Surgeon to the Manhattan Eye, Ear, and Throat Hospital, and to the Polyclinic Hospital; Otologist to the Babies' Hospital; Consulting Aural Surgeon to the Skin and Cancer Hospital, and to the New York Health Board Hospitals.

WILLIAM EWART, M.D., F.R.C.P.,

Consulting Physician to St George's Hospital and to the Belgrave Hospital for Children, London.

CHARLES H. FRAZIER, M.D.,

Professor of Clinical Surgery in the University of Pennsylvania; Surgeon to the University, Howard, and Philadelphia Hospitals.

ARPAD G. GERSTER, M.D.,

Professor of Surgery in the New York Polyclinic, and Surgeon to the German and Mount Sinai Hospitals, New York.

WILLIAM S. GOTTHEIL, M.D.,

Adjunct Professor of Dermatology, New York Post-Graduate Medical School; Consulting Dermatologist to Beth Israel and Washington Heights Hospitals; Visiting Dermatologist to the City and Lebanon Hospitals, New York City.

EDWARD JACKSON, M.D.,

Professor of Ophthalmology in the University of Colorado; Ophthalmologist to the City and County Hospital of Denver.

D. BRADEN KYLE, M.D.,

Professor of Laryngology in the Jefferson Medical College, Philadelphia.

H. R. M. LANDIS, M.D.,

Director of the Clinical Department of the Phipps Institute of the University of Pennsylvania; Associate in Medicine, University of Pennsylvania; Visiting Physician to the White Haven Sanatorium.

R. S. LAVENSON, M.D.,

Instructor in Medicine in the University of Pennsylvania.

JOHN RUHRÄH, M.D.,

Professor of Diseases of Children and Therapeutics, College of Physicians and Surgeons; Visiting Physician, Robert Garrett Hospital, Nursery and Child's Hospital, Mercy Hospital; Consulting Physician, Church Home and Infirmary, Baltimore.

WILLIAM G. SPILLER, M.D.,

Professor of Neuropathology and Associate Professor of Neurology in the University of Pennsylvania; Clinical Professor of Nervous Diseases in the Woman's Medical College of Pennsylvania and in the Philadelphia Polyclinic.

ALFRED STENGEL, M.D.,

Professor of Clinical Medicine in the University of Pennsylvania, Philadelphia.

CONTENTS OF VOLUME I

SURGERY OF THE HEAD, NECK, AND THORAX	17
BY CHARLES H. FRAZIER, M.D.	
INFECTIOUS DISEASES, INCLUDING ACUTE RHEUMATISM, CROUPOUS PNEUMONIA, AND INFLUENZA	111
BY JOHN RUHRÄH, M.D.	
DISEASES OF CHILDREN	245
BY FLOYD M. CRANDALL, M.D.	
RHINOLOGY AND LARYNGOLOGY	277
BY D. BRADEN KYLE, M.D.	
OTOLOGY	321
BY ARTHUR B. DUEL, M.D.	
INDEX	347

PROGRESSIVE MEDICINE

MARCH, 1911

SURGERY OF THE HEAD, NECK, AND THORAX

BY CHARLES H. FRAZIER, M.D.

THE FACE

Syphilitic Deformities of the Nose. The inherent difficulty, in extensive nasal reconstruction, is the obtaining of sufficient permanent projections from the surface of the face. In acquired and inherited syphilis the bones and cartilage, upon which the contour of the nose depends, are destroyed. Roberts¹ offers some suggestions for the operative correction of these deformities. He understands total rhinoplasty to mean reconstruction of the whole nose below the frontonasal suture, but the term is often used when the loss of the organ begins below the nasal bones. The flaps for reconstruction may be taken from the patient's arm, forehead, or cheeks, the frontal method having the advantage in that it requires no restraint in the patient's posture, and strips of periosteum or bone cut with the flap from the forehead may be easily embedded in the new nose. He prefers the method of Keegan when the nasal bones and the skin covering them have been preserved. The paper discusses other methods, such as those of Smith, Nélaton, and Bardenheuer, and, in the treatment of the more advanced forms of syphilitic sunken nose, Roberts describes the following: "The first stage consists in cutting a flap from each cheek near the nasolabial furrow. These are turned upward and inward to meet in the median line, and thus cover in the opening. The skin surface is toward the nasal chamber. After these flaps have been united and cicatrized, the irregularities at their base are corrected by incisions and sutures. The next major procedure is to make an inverted V incision from the middle of the forehead, the legs of which run downward and outward to points on the cheeks below the eyes. Just above the granulating surface on the former flaps, which closed the opening, a similar inverted

¹ Annals of Surgery, 1910, vol. li, p. 173.

V-shape is made. The apices of these two cuts are joined by a vertical incision in the middle line. This series of incisions marks out two rhomboidal flaps with their pedicles on the cheeks close to the sides of the nose. These flaps are then raised from the frontal and nasal bones and turned downward over the cicatricial or granulating surface of the reversed cheek flaps previously used to close the opening into the nasal chambers. The upper angle of the right flap is sutured to the base of the left ala, and that of the left flap is turned so as to reach across to a point near the inner canthus of the right eye. Sutures are employed to maintain the new relations of the frontonasal flaps which have been laid upon the overturned cheek flaps, and the wound on the forehead is easily closed in a vertical direction. The scars are inconspicuous, and much rigidity is given to the tissue interpolated between the root of the nose and its lobule. The internal surface of the interpolation is lined with skin, and so is the external." Finally, the operative treatment of large noses, and for restoring the ala or lobule of the nose, is considered. The article is illustrated by many diagrams and photographs. Watts¹ reports a successful operative result where rhinoplasty was done by means of one of the fingers after destruction of the nose by a gunshot wound.

Lexer² describes his technique and the results of various plastic operations on the face, formation of a nose or ear, correction of harelip, or defects left from removal of cancers on the face. He describes some very ingenious methods for replacing parts of the face which are lost, thus, a part of the scalp was transplanted to supply a moustache or beard; in others, a wedge from the tibia to make a frame for the nose. When he lacks support for the skin, he inserts a flap of adipose tissue from the abdominal wall, and has used the same method to correct defects in the breast after excision of a benign tumor.

Lacrymal Gland Tumors. Malignant and benign tumor formations are encountered in the lacrymal gland, the majority being benign in character and of the mixed type, in which there has been considerable discussion of classification. Brose³ reports an interesting adenoma of the lacrymal gland in which malignant change was beginning. The growth was of three or four years' duration, had slowly increased in size, causing forward displacement of the eyeball with dropping of the upper lid. It had never been painful, but the eye, when exposed to inclement weather, reddened and secreted tears. Upon examination, the tumor was found to be smooth, firm, and about as large as a small English walnut. It was partly movable, and not connected with the overlying bony wall; there was no detectable lesion of the fundus. The growth was removed through an incision carried along the orbital rim.

¹ *Annals of Surgery*, 1910, vol. li, p. 191.

² *Archiv f. klin. Chir.*, 1910, Band xcii, S. 63.

³ *Journal of the American Medical Association*, 1910, vol. liv, p. 515.

Brose believes that in the mixed tumors, all the tissues entering into the formation of the lacrimal gland are involved, with the preponderance of overgrowth of those elements of mesoblastic origin.

Postoperative Parotitis. Zesas¹ reviews the literature which has accumulated upon this subject since 1879. The majority of the cases on record (85 per cent.) occurred in women. The lesion may develop after various kinds of operations, or even after mere general anesthesia without operation. As complications, there have been reported hemorrhage, thrombosis, mediastinitis, edema of the glottis, and meningitis. The first symptom is usually high fever, without change in the wound; dryness of the mouth is also a constant early symptom. The parotid gland then becomes swollen, the left one being the most frequently involved. The trouble lasts for three or four days, and in 40 per cent. of the cases perfect recovery follows, while in the remainder suppuration occurs. Another curious fact brought out is that the parotitis is frequently crossed. Zesas advises prophylaxis in the prevention of this complication, the most painstaking care of the mouth before and after operation, and gentleness in handling the jaw while administering the anesthetic. After operation, frequent cleansing of the mouth and teeth is advisable, a little citric acid being added to the water to stimulate the secretion of saliva.

Parotid Fistula. The operations mentioned in various text-books for the cure of fistula of Stenson's duct are not always suitable to individual cases, especially when the duct remaining is short. Mothersole² devised the following method for the treatment of a case caused by excision of a part of the cheek for sarcoma. A large scar, about one and one-half inches in diameter, was left on the cheek, with the fistula from the parotid gland in its upper part.

"Under chloroform, the mouth having been made as aseptic as possible, a flap of mucous membrane, one and one-fourth inches long and a third of an inch broad, with its long axis horizontal, was dissected up from the inside of the right cheek, so that it was left attached only by its front end near the internal opening of the parotid duct. A hole was then bored through the cheek, just in front of the fistula, and dilated so that the flap could be easily brought through the perforation. The surface of the scar on the cheek was then dissected up and removed, except for a small collar of tissue surrounding the fistulous opening above, behind, and below; to this the free end of the flap of mucous membrane was attached by a few interrupted sutures of fine catgut. There was now a track lined by epithelium running from the parotid gland to the inside of the mouth. The raw surface on the cheek was covered by a flap of skin from the neck just below the horizontal ramus of the jaw, left attached at its posterior end, and rotated through a

¹ Centrbl. f. d. Grenzgeb. d. Med. u. Chir., Band xii, S. 721.

² Practitioner, 1910, vol. lxxxiv, p. 263.

quarter circle in the same plane, so that its front end became uppermost. The resulting gap was closed by interrupted suture, except for a small triangular surface at its widest part. There was a little suppuration about the upper part of the wound, and some of the catgut sutures were discharged on to the cheek, but the whole wound had soundly healed a fortnight after the operation, and all the parotid secretion passed readily along the new channel. When last seen, some sixteen months afterward for an attack of bronchitis, the condition of the parts was altogether satisfactory; a probe could be easily passed from the mouth along the duct."

Carcinoma. Marassovich¹ reports the cases of carcinoma of the face and scalp treated in Hochenegg's clinic from 1901 to 1908, 182 in number.

The localization was as follows: Nose, 58 cases; lower lip, 47 cases; upper lip, 5; inner angle of eye, 20; outer angle of eye, 9; forehead, 14; ear, 4; cheek and upper part of the face, 22; scalp, 3.

The lesions were of two types: the squamous-celled, slow-growing tumors, and the basal-celled, rapid-growing cancer, giving rise to ulceration and early metastasis. The carcinomata localized at the angles of the eyes deserve special mention, because the clinical course of these tumors is particularly malignant, although they are mostly of the squamous type; 148 cases were treated by operation, and of these, 41 have disappeared; 8 have recurred; 33 have died since operation—of these 8 with recurrence; the remaining 66 have remained well.

THE JAWS

Depressed Fracture of the Malar Bone. Erdman² describes the following simple method of reduction: "The bone is firmly grasped through the swollen tissues of the cheek with bullet forceps, in the manner an iceman holds a cake of ice. The upper prong of the forceps is first inserted just back of the orbital rim, and the lower through the cheek below the prominent part of the malar bone, and a firm pull made on the scissors-like handles of the instrument. The bone comes up into place with surprising ease, and tends to remain in position when once reduced. No dressing is necessary, as the two punctured wounds in the skin made by the points of the forceps are negligible. No scar is left. Only nitrous oxide anesthesia is needed."

Treatment of Mandibular Fractures. As is well known, there are two general schemes in vogue in the treatment of fractures of the jaws, *i. e.*, the application of external support and the use of interdental splints. Wiring has been advocated at times, but it is so apt to cause loosening of

¹ Deut. Zeit. f. Chir., Band civ, Heft 1, 2.

² Boston Medical and Surgical Journal, 1910, vol. clxii, p. 532.

the teeth, and is so difficult of application, that but few surgeons have recourse to it at the present time. Oliver¹ believes that the objection to methods of wiring are due to faulty modes of application, and to the kind, size, and strength of wire employed. Accordingly, he advocates the use of soft drawn copper wire, 20 gauge, which is inserted around the adjacent teeth in an intricate manner, producing a triangular geometrical figure, "with its first stretch" a long horizontal line from median to superior lateral loop, a short prependicular line from superior to inferior lateral loop, and a long slanting diagonal line from inferior lateral to median loop in which the twist has been made. In the discussion on this paper, Power objected to the absolute fixation of the upper and lower jaw produced by this method, and believes that an interdental splint is preferable.

Tumors of the Jaw. Speese² discusses the surgical aspect of *epulis* and *sarcoma*. He refers to the tendency in modern times to describe as an epulis only those sarcomatous and fibromatous tumors originating on the alveolar margin, and to designate the other growths in this region by their true pathological name. The peripheral forms of sarcoma are painless in the beginning, until ulceration or infiltration of the bone occurs, or until the neoplasm presses upon the nerves. The shape of the growth and the results of palpation demonstrate its origin. The central forms of sarcoma produce more or less hard, rounded, circumscribed tumors, which generally enlarge toward the outer surface, and may be mistaken for dentigerous cysts. Later in the course of the growth the cortical layers of the compact bone become rarefied, and a crackling sensation may be produced. As the tumors enlarge, pressure symptoms develop, such as edema of the eyelid and mucous membrane of the antrum, dislocation of the eyes or teeth, dilatation of the superficial facial veins, obstruction of the nasal duct, and difficulty in speaking and swallowing may occur.

Treatment depends upon the histological type of tumor and the extent of the growth. Partial resection of the jaw has met with considerable success, but is only indicated for a small, well-circumscribed giant-celled sarcoma, or sarcoma of the hard palate. All other growths should be subjected to total resection. In the discussion on this paper, Coplin stated that he did not believe that the prognosis could be based upon histological examination unless the tumor contained many giant cells; in round- or spindle-celled growths, the outcome depends largely upon the resistance of the patient.

König³ reports the results in his total resections of the upper jaw, 48 in number, for cancer, performed between 1875 and 1895; 19 died as the result of the operation; 2 died in the first and second

¹ Journal of the American Medical Association, 1910, vol. liv, p. 1187.

² Annals of Surgery, 1910, vol. lii, p. 492.

³ Archiv f. klin. Chir., 1910, Band xcii, S. 913.

years after operation without recurrence; 8 were permanently cured, one dying eleven years and one nineteen years after operation without recurrence. The 6 others are free of recurrence, twenty-six, twenty-three, twenty-three, twenty-two and one-half, twenty-one, and nineteen years after operation. He insists upon radical removal, even if it be necessary to include the zygoma, the walls of the orbit, and even the dura to the optic foramen in the excision. The depths of the wound, the base of the cranium, and the pterygoid process must be examined, and, if necessary, cleaned. In only two of the cases were the lymph nodes involved.

Cysts of the Jaws. Lewis¹ reports three cases of the rather rare *adamantinoma*. The first patient had noted a swelling, giving rise to considerable pain, and involving the right half of the mandible in the region of the molar teeth. It had existed for five years, and gradually increased in size. The tumor was larger than a fetal head, and extended down to the hyoid bone in front, into the parotid compartments behind, into the middle of the ramus of the jaw above, and well into the mouth cavity internally. Externally, the tumor was covered by thin and trophic skin; the growth was partially cystic, but no parchment-like crepitation could be elicited. The x-ray picture revealed soft, large, cystic cavities. Several large cysts were aspirated, and, after partial collapse of the growth, it was removed with a portion of the jaw. It was found to be made up of a large number of cysts, varying in size from a lentil to a walnut, lined by a granular membrane, reddish or greenish in color. Interspersed throughout the tumor were solid white masses of tissue; there was very little bone in the tumor, most of the septa being entirely fibrous. Microscopic examination revealed epithelial groups in columns, reproducing the enamel organ in different stages of its development.

The second case occurred in a woman, aged fifty-six years, who for fourteen years had pain and swelling in the side of the face. Nine years later a portion of the jaw was removed, and a diagnosis of *dentigerous cyst* was made. One and one-half years ago the tumor again recurred. It was removed by intra-oral enucleation carried wide of the capsule. The tumor was as large as a hen's egg, and composed of small cysts containing mucoid material. Microscopically three different types of cells were found, having their prototypes in the epithelium of the embryonal enamel organ, the cylindrical epithelium forming the tunica interna, polygonal cells forming the stratum intermedium, and stellate cells forming the zona media of this structure.

The third case was seen in a girl, aged fourteen years, who thirteen months before noted a small white spot on the mucous membrane of the upper jaw over the site of the left canine tooth. There was no pain

¹ Surgery, Gynecology, and Obstetrics, 1910, vol. x, p. 28.

or other subjective symptom, and a growth appeared, gradually increasing in size until as large as a hickorynut. The growth and a portion of the alveolar process were removed, and, when examined microscopically, was reported to be a spindle-celled sarcoma. Six months after the operation a small cyst appeared at the site of the incision, which was opened and cauterized, but again recurred. Some months later a large tumor formed, which caused the left malar region to bulge prominently, and forced the upper lip so far forward that the mouth could not be completely closed. The left upper maxilla was then excised, and the tumor found completely filling the antrum of Highmore, involving the anterior wall of the antrum and the alveolar and palatal processes. Microscopically, the tumor was found to contain cells probably representing the earlier stage of development of the enamel organ; there were few polygonal or stellate cells present. Lewis then discusses the literature of these adamantine tumors, and believes that the resection in all cases should be carried wide of the growth, as it is practically impossible to enucleate the cysts. Curettage of the lining membrane offers no guarantee of permanent cure. If the bone has been destroyed by the growth, or if the tumor has reached a large size a typical resection will be necessary.

Chloroma of the Jaws. This affection is extremely rare, and an interesting case is reported by Bruce¹ with a complete history, postmortem examination, and histological study of the organs; there is also a colored photograph illustrating the appearance of the lesion and photomicrographs illustrative of the histology.

There are 54 cases of this peculiar affection on record, the growths being situated in some part of the head in all but 14 cases. The most frequent sites were the orbit, 23 cases, usually involving the periosteum; the dura or sinus, 26 cases; the temporal bone, especially the auditory region, 13 cases; the temporal fossa, 12 cases; the sphenoid, 4 cases; ethmoid, 4 cases; choroid plexus, 2 cases; also the nose, nasal pharynx, maxillary antrum, pterygoid fossa, soft palate, gums, and mastoid. The vertebrae were affected in 14 cases, and the ribs in 13. The periosteum of the sacrum, coccyx, iliac bones, the bones of the extremities, diploë of the skull, and various flat and short bones, the bone marrow, liver, kidneys, spleen, and lymph glands, especially those of the cervical region, were also found to be the seat of green infiltrations of tumors.

Clinically, the patient complains of weakness, pallor or anemia, exophthalmos, deafness, swelling of the temporal region, enlarged lymph nodes, emaciation, rapid pulse, pain in the head, eyes, feet, hips, or legs, hemorrhages in the skin or mucous membrane, and finally blindness with large liver and spleen, or, as in one case, the eruption of small tumors

¹ *Annals of Surgery*, 1910, vol. li, p. 52.

over the body. Some of these symptoms are due to the mechanical results of the growths; others, such as weakness, fever, emaciation, etc., are toxic in origin; and the remainder, such as pallor, hemorrhage, etc., are due to alterations in the blood.

Chloroma, histologically, has a structure resembling that of leukemia, and has been classified by different authors as a lymphoma, lymphosarcoma, or an acute myeloid proliferation. The green color of the tumors is due to a greenish decomposition product of hemoglobin, or possibly to a degeneration of the glandular protoplasm, or myelocytes and myeloblasts. The blood resembles that of acute leukemia.

Actinomycosis. Lord¹ summarizes the result of his investigations as follows: "Organisms having the morphology and staining reaction of actinomycosis have been constantly found in smear preparations (11 cases) and in serial sections (5 cases) of the contents of carious teeth from individuals without actinomycosis. They are present in such numbers as to suggest that they play a fundamental part in dental caries."

Following the intraperitoneal inoculation of guinea-pigs with the contents of carious teeth, omental tumors, histologically identical with actinomycotic tissue and containing typical club-bearing actinomyces granules, have been produced in 3 (60 per cent.) of 5 animals. He believes that these findings explain the frequency of actinomycosis of the jaw, the root canal of the tooth being the channel of infection. From the teeth, organisms may be implanted in neighboring tissues, or find lodgement in more remote parts of the body by way of the respiratory tract or the alimentary canal.

Chauffard and Troisier² describe a case of *actinomycosis of the side of the neck* which presented the following symptoms: Extreme hardness of the tumor, trismus, intense pain, rigidity of the neck, and condition of general good health. The patient was a coachman. A serum test was made by spore-agglutination and this was positive in 1 to 100 dilution. The reaction of fixation was also positive, and the opsonic index was below normal. The seroreaction for syphilis was negative. After treatment with potassium iodide, 4 grams per day for a year, the man entirely recovered, and only a slight induration remained.

Alfred Stengel³ observed a case of *actinomycosis of the cheek* following its penetration by a dental instrument. A week later an indurated area appeared, and gradually increased in size. At operation, the mass was found to be of a uniform pinkish color, with no signs of softening or breaking down within; later, softening did occur, and actinomyces bodies were discovered in the discharge. Increasing doses of potas-

¹ Boston Medical and Surgical Journal, 1910, vol. clxiii.

² Rev. de Méd., 1909, vol. xxix, p. 753.

³ Medical Record, June 4, 1910, vol. lxxvii, p. 954.

sium iodide, up to 60 grains daily, were given without materially influencing the progress of the growth, but the use of iodine locally in the incisions and sinuses was followed by prompt improvement, and within a fortnight the whole area of infiltration had resolved. Stengel observed this case in 1900, and there is now no evidence of any recurrence.

Arrowsmith¹ reports a case in which a patient, aged nineteen years, who had formerly lived on a farm and worked among horses and cattle, noticed a slight hoarseness which gradually increased. The epiglottis was found slightly thickened, and to the right of the median line on the laryngeal surface, there was a small whitish deposit. Both cords were covered by masses of white tissue which extended down the trachea. Examination of portions of the mass made the diagnosis of actinomycosis. Potassium iodide did not improve the symptoms, and the patient developed pulmonary lesions.

Müller² reports a rare case of *actinomycosis involving the orbit* of a thirty-three-year-old woman. For about a year she suffered with swelling and pain in the right cheek and temple, later the neck became swollen, exophthalmos developed, and fistulæ appeared beneath the eyebrow from which the granules of actinomyces were recovered. The malar bone and much of the orbital wall were resected. Improvement occurred for a time, but a year later the patient died with brain symptoms. Nine other cases are reviewed, and the prognosis is very bad, eight of the nine having succumbed to meningeal involvement by way of the superior orbital fissure or optic foramen. The duration of the case will rarely extend over a year, and operation (resection) should therefore be done early. A full bibliography is appended.

Krymow³ collects the cases of *actinomycosis of the tongue*, 26 in number, and adds two observations of his own. There are three types: A hard tumor, a localized abscess, and diffuse suppuration, the first form usually terminating in abscess formation. The disease begins in the tongue muscle, the overlying mucous membrane not being involved as a rule, although bluish or purplish in color. The tumor projects above the surface and is usually of the size of a hazelnut. Fluctuation usually develops. The growth must be distinguished from lipoma, fibroma, chondroma, and tuberculosis if hard, and from the ordinary abscess and syphilis when soft. As to treatment, iodine must be administered internally; if the mass is hard and circumscribed it should be excised and the wound sutured; if softening has occurred, the collection must be incised, evacuated, the cavity curetted and packed with gauze saturated with tincture of iodine. The prognosis generally is good.

¹ Laryngoscope, October, 1910.

² Bruns' Beiträge, 1910, Band lxxviii, S. 135.

³ Archiv f. klin. Chir., Band xcii, S. 1142.

THE MOUTH

Tuberculosis of the Lip. This is a very rare affection, and is usually divided into two distinct groups: First, the solitary ulcer beginning on the lip itself; and secondly, ulcerated areas that are secondary to tuberculous disease of the mouth or face. Armstrong¹ reports an example of the first type in a man, aged fifty-three years, who three months before had noted a beginning small ulcer on the lower lip. The ulcer itself was soft and without infiltration, and, for a short distance around the edges, the skin and mucous membrane were reddened and slightly infiltrated. One enlarged gland was palpable in the submaxillary region, and one on the submental. There were signs of pulmonary tuberculosis present. The growth and the lymph nodes were removed and were pronounced tuberculous by the pathologist.

Congenital Fistula of the Lip. Oberst² reports an example of this rare anomaly. The child, in addition to a double harelip and cleft palate, had a saucer-shaped depression in the lower lip, from the bottom of which a fistulous tract 2 to 3 mm. broad led into the mouth. A plastic operation cured the condition. He explains the origin of the fistula on embryological grounds as being similar to that of harelip.

Carcinoma of the Lip. For several years I have been calling attention to the fact that the so-called V operation was inadequate and responsible for many recurrences in the treatment of cancer of the lip. Many surgeons, however, have a deep-rooted prejudice against removing the lower lip for fear of the resultant deformity, although, if the plastic portion of the operation is properly performed, there is but little deformity at any time. Stewart³ believes that not one-third of a representative surgical body regularly does a radical operation in every case of epithelioma of the lip. Stewart describes his operation as follows: "The first incision extends just below the jaw from one angle to the other and cuts the skin and the platysma muscle, which are then carefully dissected down to the level of the thyroid cartilage. All tissues down to the muscles are then sectioned at this line, and a clean dissection is made, elevating all loose connective tissue, lymph nodes, etc., in a flap which extends laterally to the great vessels on each side. The facial artery and vein are ligated, and the submaxillary glands are loosened and raised in the flap on each side. Incisions are now made at each side of the epithelioma far enough away to include all infiltrated tissue, and these are carried down to the cross-section already made. The lateral flaps are now dissected free from the jaw, keeping close to the skin at the lower part to avoid lymphatics, and, finally, the intervening central

¹ *Annals of Surgery*, 1910, vol. li, p. 520.

² *Bruns' Beiträge*, 1910, Band lxviii, S. 795.

³ *Journal of the American Medical Association*, 1910, vol. liv, p. 175.

mass is loosened from the jaw and removed. This contains the tumor, a fan-shaped mass of skin, and the deeper tissues attached to the lymph nodes of the neck, and the submaxillary gland by a loose flap of tissue which contains the connecting lymphatics.

"The submaxillary glands should always be removed, not because they are infected in early cases, but because there is regularly a lymph node attached to each which is one of the first to be involved. In cases in which not over three-fourths of an inch of the vermilion edge of the lip has been removed, simple suture of the wound, with drainage of the submaxillary fossæ, completes the operation. In cases in which the mouth must be extended on account of more extensive removal of the lower lip, the procedure shown in the drawings is convenient. The mouth is broadened by a straight incision outward at either or both angles, and this incision is carried down to, but not through, the mucous membrane, and stitched to the raw surface of the new lip. To avoid puckering of the upper lip, the latter is then cut one-half of an inch higher, and a triangle of skin is taken out of the cheek to allow of the smooth drawing together of the lower lip. The new chin should be sutured to the soft tissues over the lower jaw to exclude mouth fluids from the neck wound. This sometimes fails and there is an offensive suppuration in the wound; the same accident may occur with a closed mouth, apparently from infection by mouth germs through the cut duct of the submaxillary gland. Final union is always good, and the cosmetic results are remarkable considering the amount of lower lip often removed. There should be no mortality after this operation, except from accidents due to anesthesia, embolism, etc."

THE TONGUE

Malignant Disease of the Tongue. Eve,¹ in some remarks on the surgical aspects of the subject, states that he severs the mandible in removing any growth in the tongue of considerable size, especially if it extends as far back as the anterior pillar of the fauces; and still more so if it involves the floor of the mouth. He also believes that, exclusive of quite small growths, the muscles of the tongue should be divided near their several origins. In performing Syme's operation, he always has a dental splint prepared beforehand, which can be fitted at the end of the operation. When it is necessary to clear the whole side of the neck, he prefers to carry the incision over the middle of the sternomastoid muscle; a second incision is made from the centre of the vertical one to the chin, and the flaps outlined are turned upward and downward respectively. In those cases in which glands in the posterior triangle

¹ Clinical Journal, 1910, vol. xxxvi, p. 113.

are extensively involved, he makes an incision from the centre of the first vertical incision, backward and obliquely upward toward the spine of the axis. He does not, as a rule, remove the glands on the unaffected side unless they are actually enlarged. The exceptions to this rule, however, are numerous, and include all growths in the tongue originating in or approaching the middle line—those deeply infiltrating the under surface of the tongue, those arising in the top of the tongue or implicating the floor of the mouth at or near the frenum.

He also reports two rare cases of endothelioma of the tongue presenting many features in common. In each, the growth occupied the extreme base of the tongue and found a prominent disk-shaped mass which was not ulcerated on the surface. The nodes in the superior triangle were distinctly enlarged in both cases. The symptoms were chiefly those of discomfort and a feeling of a foreign body in the fauces. One tumor was of a lymph-endotheliomatous type, the other a perithelioma.

THE NECK

Cervical Rib. Since the exhaustive paper of Keen, in which he reported having collected 43 cases of this interesting anomaly, there have been a number of case reports published. Osler¹ reports an instance in a woman, aged thirty-one years, who, for ten or twelve years, had noticed a pulsation above the clavicle on both sides, most marked on the left, and suggesting the possibility of an aneurysm. She had tingling and numbness, and, upon use, the arm felt swollen and hot, and power seemed to be lost. When quiet and at rest the arm felt natural, and ordinary work could be done with the fingers. An x-ray picture showed the presence of a cervical rib on either side. Osler then calls attention to the similarity in the symptoms of this and another case which he had reported to the Philadelphia Neurological Society, in 1888, which attracted a good deal of attention at that time. Osler comments upon the possibility of mistaking the dilatation caused by the hooking of the artery over the rib and under the scalenus anticus muscle, with a true aneurysm.

Francine² reports four cases of cervical rib, two of them flail-like. The x-ray of these two cases showed that the rib at its extremity had a true phalanx or distal segment in all probability.

Bird and Smith³ report ten cases of cervical rib, of which five were operated upon. They urge operation when the pain is severe, or when there is distinct evidence of organic change, shown by muscle wasting, anesthesia or paresthesia, absence or diminution of pulse, or coldness and blueness of the hand. They employed a vertical incision, three

¹ American Journal of the Medical Sciences, 1910, vol. cxxxix, p. 469.

² Ibid., p. 108.

³ Australian Medical Journal, 1910, vol. xv, p. 343.

inches long, beginning an inch above the clavicle, and extending upward along the outer edge of the sternomastoid from the clavicle. The phrenic nerve must be avoided, and the brachial plexus liberated and drawn inward, except in those cases where the rib is more extensively developed and the artery very high, in which case the plexus is best retracted outward. The pleura must be carefully avoided. It is essential to remove the periosteum with the rib.

Hamann¹ records an interesting case in which a bursa, about three-quarters of an inch in diameter and containing clear, serous fluid, encircled the artery where it lay in contact with the bone. The subclavian was thrombosed at the point of contact, but there was probably canalization of the thrombus.

Tuberculous Adenitis. Bennett² discusses his experience in the treatment of a series of cases of tuberculous disease of the lymphatic glands, especially those of the neck. He considers that the various stages in the life of a gland which has become tuberculous may be taken as follows: (1) Traumatic or infective adenitis. (2) Invasion by tubercle bacilli. (3) Resolution, caseation, or suppuration. (4) Suppuration after caseation.

The gland, presumably tuberculous, which changes in size, sometimes large, sometimes small, is a dangerous gland and is often distinct evidence that the original source of infection still exists and requires urgent measures for its cure. Such a gland is either the site of a gross deposit of tuberculosis, or of the formation of a focus of suppuration in the centre of the gland, and sooner or later will burst its capsule and invade the surrounding tissues. One important point should never be lost sight of: An enlarged gland or cluster of glands always retains its oval glandular shape so long as the disease is confined within the gland capsule. The tumor resulting, therefore, whether large or small, has rounded margins and is distinctly defined. If this characteristic contour becomes lost, it is not because the gland is decreasing in size and the disease subsiding, but is rather due to the escape of the broken-down contents into the parts around. As a rule, the primary focus of infection lies either in the nasopharynx, the tonsil, or the adjacent throat region and skin; the glands so infected lie beneath the deep fascia, and it is only when they have arrived at a certain stage of enlargement that they become perceptible. When perforation of the capsule occurs, the disintegrated contents invade the surrounding tissues, the capsule becomes adherent to the deep fascia, and each is perforated by broken-down contents, thus forming a flattened swelling under the skin veiling the outline of the diseased gland itself. This secondary or superficial swelling is often mistaken for the enlarged or diseased gland itself, and the surgeon is misled into thinking that the complete clearing out of the superficial

¹Cleveland Medical Journal, 1910, vol. ix, p. 453.

²Practitioner, 1910, vol. lxxxiv, p. 741.

mass of broken-down material has removed the disease, whereas the gland at fault is left untouched beneath the fascia. This mistake is made all the more easy by the fact that the disintegrated material is enclosed by walls of infiltrated connective tissue, which acts singularly like the gland capsule after the contents have been removed by scraping.

Bennett considers the *treatment of diseased glands* under the following heads: (1) During the primary adenitis. (2) During the stage of bacillary infection. (3) During the stages of softening and suppuration. (4) After caseation and calcification.

1. *Treatment during the Primary Adenitis.* Excepting in those cases in which suppuration rapidly occurs and must be treated as an ordinary abscess, treatment should be directed to the focus of infection, no matter what the situation or nature of this focus may be. If no focus of infection can be found, and the gland varies from time to time in size, its removal is strongly indicated.

2. *Treatment during the Period of Bacillary Infection.* The primary source of infection having been cured, the affected gland or glands should diminish in size, but, if the enlargement persists, it is very suggestive of invasion by tubercle bacilli. The methods of treatment then available are by tuberculin, open-air and climatic methods, and the traditional treatment by drugs and specialized nutrition. Bennett does not believe that the tuberculin method does much good except in cases in the very early stages of the bacillary invasion; in many cases the recovery which is put down to the use of tuberculin is due rather to the better hygienic conditions and to the quality and abundance of food with which the patient is provided. He does not decry the method, but believes that it is expensive, irksome, and of no benefit in advanced cases. He urges the use of the *x-ray* to determine the presence of caseation, and states "that glands, the site of tuberculous disease, which show a shadow upon *x-ray* examination are unlikely to be amenable to treatment by tuberculin." The tuberculin method may be used, however, for persistent sinuses after operation. He believes that continued residence at the seaside, or preferably on board of ship, is infinitely more beneficial than treatment in high altitudes. Bennett also records the unusual observation that "a child having left his place of birth to reside elsewhere, will later, if it develop tubercle, derive more benefit by returning to the place of its nativity than any other place, provided, of course, its birthplace was not a crowded town or an obviously unsanitary locality." He believes that, as a rule, a tuberculous gland should not be worried by local applications. When very chronic, however, vasogen iodine may be given by inunction. The main drugs which offer help are arsenic and iodine.

3. *The Treatment during the Stages of Softening and Suppuration.* Bennett believes that when a gland, after having for a time been hard, becomes soft to the touch, it should be removed, no matter whether

the softening is merely due to the formation of granulation tissue or to suppuration. He is strongly opposed to the injection of iodoform, carbolic acid, or other potent medicaments in the diseased glands of this type. The main object of operation should be to remove a deep gland before its broken-down contents escape from the capsule, and to extirpate a superficial gland before the skin becomes involved in the inflammatory process. Such glands may be removed whole and the wound sutured, as immediate union is practically certain. When the broken-down contents have perforated the capsule, formal dissection is not feasible, the diseased parts must be removed by scraping, etc., with the use of a small drainage tube for twenty-four or forty-eight hours. In dealing with glands beneath the fascia, in which the disintegrated contents have perforated the capsule within the fascia, it is important to carefully search for the small opening in the deep fascia, which, when found, leads directly into the centre of the diseased gland.

4. *Persistent Sinus after Operation.* Such a condition may be attributed to one of two causes, either the disease has been inadequately removed, or the operative area has become infected by some microörganism other than the tubercle bacillus. Such cases should first be treated by appropriate vaccine or tuberculin, and the cure is often appreciably hastened by emptying the sinus and introducing hyperemia by Bier's suction glasses. If definite thickening or induration is obvious, or if it be evident that the diseased gland has not been removed, a second operation may be necessary.

5. *Treatment after Caseation and Calcification.* In such cases pain, with or without tenderness, may occur, and, in delicate or debilitated subjects, suppuration may occur around the calcified mass, which is for practical purposes a foreign body. If such symptoms arise, the calcified masses should be removed.

Judd¹ calls attention to the *glandular collar*, composed of the six groups of glands, which drains the entire scalp, skin, and mucous membrane of the head and face, each group sending its drainage to the deep cervical chain. The latter lie almost entirely behind the sternomastoid muscle in the upper half of the neck, while in the lower division they lie opposite the posterior border and in the supraclavicular triangle. The chain extends from the tip of the mastoid process to the juncture of the internal jugular and subclavian veins, and receive the lymph from the cervical collar, and directly from the scalp, tongue, palate, esophagus, and thyroid. The vessels leading from these groups unite on either side of the neck and empty, on the right side, into the internal jugular and subclavian veins, and, on the left side, directly into the thoracic chyle duct. Judd then calls attention to the extremely important point that, owing to the anatomical arrangement of the glands and vessels,

¹ *Annals of Surgery*, 1910, vol. lii, p. 758.

direct extension from the cervical glands into the mediastinal glands is impossible, and therefore, that inflammations or neoplasms affecting the cervical lymphatics are local until they pass into the general circulation.

He was seldom able to trace the source of entrance of the infection, and an examination of several hundred tonsils revealed tuberculosis in much less than 1 per cent. In 80 per cent. of cases, the first enlargement was noted beneath the upper end of the sternomastoid muscle, and in 18 per cent. the first noticeable enlargement was in the submaxillary, submental, or parotid regions.

He calls attention to the regular occurrence of hyperplastic glands in children, which cannot be differentiated at times from the initial stage of glandular tuberculosis. In such cases, their method of treatment has been as follows: First, clear the throat of adenoid tissues and tonsils, and give such attention as is necessary to the teeth and nose. Assisted by tonics, especially syrup of ferrous iodide and outdoor living, this treatment has been sufficient to cure most of these cases. If caseating nodes are detected, they should be removed, and if the glands still continue to enlarge and other glands become involved, a complete excision will be required. In the presence of a discharging sinus, excision should not be performed until after curetting and treatment by swabbing with equal parts of tincture of iodine and carbolic acid until the sinus has healed. Pulmonary involvement is not necessarily a contraindication to operation, as, in 10 patients, 9 were greatly improved, several of them being comparatively cured, and only one developed an acute diffuse tuberculosis.

Judd makes his incision as nearly as possible transverse, as suggested by Dowd. "The incision begins a little below and behind the mastoid process, extends straight down along the outer edge of the trapezius muscle, and then curves forward a little below the middle of the neck and terminates at the juncture of the sternomastoid muscle and clavicle. Through this incision we are able to remove all of the deep descending chain, including the supraclavicular, the anterior, and the posterior groups. If the submaxillary and the submental groups are involved, a second incision running parallel to the lower jaw, two finger breadths below the lower border, will expose the areas and avoid any important structures, *e. g.*, the lower branches of the seventh nerve. In order to prevent the formation of a wide, ugly scar, it is very essential that we turn back the platysma muscle and the skin in each flap. It is also important that the cut edges in the platysma muscle be sewed together before closing the skin. If these cut edges are allowed to retract, the separation will favor the division of the skin scar. In the past it has not been unusual to see a scar on the neck half an inch to one inch in width. Having made the incision from the mastoid to the clavicle, we reflect the skin and platysma well forward and backward. We do not

cut the sternomastoid, except a few posterior fibers of its upper attachment on the mastoid process. The entire posterior border of this muscle is freed, and the fascia dissected from it. The dissection is started at the lower angle underneath the clavicular attachment. The omohyoid pulley is exposed, and this is the lowest point of the dissection. The glands are all left together in the fascia as much as possible. In some cases the gland-bearing fascia can be dissected with gauze or the finger; at other times, especially if the x-ray has previously been employed, or if considerable resistance has developed, the dense fibrous tissue will necessitate sharp dissection. In freeing the edge of the sternomastoid muscle from below, about half-way up we come to the superficial cervical nerves, some of the branches of which turn over and cross the muscle. These are purely sensory nerves, and it is best to sever them and get a good exposure. A numbness, which persists for some time, occurs after cutting these nerves. One-half to one inch above the sensory nerves the spinal accessory emerges from the sternomastoid muscle and passes obliquely downward and outward superficially through the fascia to the trapezius. In carrying the fascia upward, we should, if possible, save the cervical fascia covering the brachial plexus. Traumatism of this plexus will frequently cause considerable suffering. The thoracic chyle duct as it enters the vein should be avoided. It is not uncommon to see the chyle duct on the right side. We have injured this duct during operation in about ten cases; in several instances it healed without causing trouble. In three cases, the chyle drained profusely for several weeks, and the patients became greatly emaciated. One of them lost sixty pounds; the duct eventually closed, however. All the patients made a good recovery. When the spinal accessory nerve is encountered, it should be dissected free from the fascia and held back while the fascia and glands are turned underneath it. As soon as the internal jugular vein is exposed, it is best to partially occlude its lumen in the lower angle by a gauze pack. This will keep the vein full, and prevent sucking of air in case the vein is torn. On several occasions we have heard air sucking into the vein, but have seen no bad results from it. The dissection along the entire jugular vein is sometimes tedious, but we have sacrificed the vein in tuberculous cases in only two instances. Some care should be taken to avoid the phrenic nerve lying on the anterior scalenus muscle. The fascia will lead us directly to the styloid and mastoid. Lymphatic glands within the parotid should be shelled out in a manner that will not interfere in any way with the branches of the seventh nerve. Having completed the dissection, if caseous material has soiled the wound, we mop it out with tincture of iodine well diluted with water; or, as suggested by von Eiselsberg, the entire wound may be mopped for an instant with boiling water. We have never seen any sort of an infection following the spilling of caseous material on the fasciæ.

"Drainage should be provided through a stab incision; we use, preferably, a small rubber tube split spirally. This drain is for the purpose of withdrawing serum, and is removed in from twenty-four to forty-eight hours. The platysma muscle is carefully sutured with fine catgut, and the skin edged approximated by a subcuticular suture approximating as much of the cut of the skin as possible, giving the appearance of a ridge. In a few days this will smooth down to a line scar. A rather small, snugly fitting gauze dressing is used. The next day the patient is gotten up, and encouraged to move the head freely to prevent any stiffening of the muscles. From this time general outdoor treatment is advised.

"In our series of cases we have had no mortality due directly to the operation. One patient died a few weeks after operation of general tuberculosis, and a second died in about three months from diffuse sepsis."

TABLE OF CASES

Total number of patients operated upon	649
Total number of operations	750
Average age	25
Number of cases under ten years of age	18
Complete excisions	668
Curetted	62
Both sides operated upon	94
Recurrence in region of former operation (8.6 per cent.)	56
Died of pulmonary tuberculosis (5 per cent.)	19
Mortality (1 died in 4 weeks, 1 in 3 months, 4 in 1 year, 5 in 2 years, 2 in 3 years, 2 in 4 years, 1 in 5 years, 2 in 6 years, 1 in 8 years).	19
Died of tuberculous lesions other than pulmonary	9
Mortality (2 meningitis, 5 diffuse tuberculosis, 2 tuberculous peritonitis)	9
Died of other trouble	14
Number of patients with pulmonary tuberculosis at time of operation	10

Farr¹ emphasizes the necessity for preserving the submaxillary branch of the facial nerve in operations on the neck. This nerve supplies the depressor muscles of the lip, lies in intimate contact with the nodes most frequently involved in the tuberculous process, and is very often pressed on, cut, torn, or crushed, with a resulting more or less complete terminal paralysis of the lower lip. He does not believe that the given statement is true, *i. e.*, that other branches of the facial or cervical nerve will compensate for its loss, because motor nerves are end nerves, and do not take up the function of neighboring functions. It is probable that occasionally recoveries from this paralysis are due to a minor degree of trauma primarily, or perhaps to a union of the severed nerve when the ends are favorably placed. In order to avoid injuring the

¹ Annals of Surgery, 1910, vol. lii, p. 487.

nerve, he recommends that incisions should be made transversely, and at least three-fourths of an inch below the jaw. As the nerve clings tightly to the under surface of the superficial layer of the deep fascia, the latter should be incised freely until the vessels and glands are exposed, and then retracted upward with the skin flap.

Philip¹ has been disappointed at the results of surgical treatment, as oftentimes the tuberculous process continued to advance after operation. He believes that suppuration in a gland is a relatively uncommon event, and is merely an incident to the more insidious tuberculous process. Treatment must, therefore, be directed chiefly to the essential lesion, rather than to the incidental occurrence, and attention should be directed not to the caseous gland but to the fine multiple and spreading involvement of the lymph nodes indicating tuberculous involvement. He is now an advocate of the use of tuberculin, in order to activate the leukocyte and the bacteriotrophic elements of the lymph stream and blood. He has used Koch's original tuberculin (initial dose 0.0001 gram), Koch's T. R. ($\frac{1}{5000}$ to $\frac{1}{2000}$ milligram), and latterly Bèraneck's tuberculin (0.1 c.c. of a 1 in 100,000 solution). The effect is estimated by careful observation of temperature, pulse, local appearances, and the patient's aspect. He does not deem the determination of the opsonic index necessary. Berghausen² also advocates vaccine treatment of tuberculous cervical adenitis in children.

X-ray Treatment. A number of papers were published last year bearing upon this question, most of which, as usual, described two or three cases in which excellent results have been obtained, but do not attempt to discuss the condition of the patient sometime subsequent to the treatment. Leonard³ reports the case of a woman, aged fifty-seven years, who had for six years persistent sinuses and open scars that refused to yield to careful surgical dressings. In addition, there were enlarged glands. All of these lesions yielded to Röntgen treatment, and the patient has remained well for the last four years. It is, of course, perfectly evident that such cases may easily be cured by the x-rays owing to its stimulating effect upon the tissues, and it is almost as certain that the case would have yielded to opsonic treatment. Leonard divides the types of cervical adenitis into, first, the early cases in children and young adults, which can be cured by a short course of treatment; second, those in which recurrence has followed, and that, too, after operation with entire healing of the skin; and third, those in which sinuses persist after surgical operations, and the scar has refused to heal after prolonged antiseptic treatment. In these cases, Röntgen treatment, in addition to antiseptic precautions, produces permanent

¹ Lancet, July 2, 1910, p. 19.

² Ohio State Medical Journal, 1910, vol. vi, p. 530.

Journal of the American Medical Association, 1910, vol. liv, p. 1596.

healing with a decrease in the amount of scar tissue. It is therefore evident "that Röntgen treatment is the most effective method of treating tuberculous cervical adenitis in all its varieties." This sweeping statement does not strike me as representative of the facts or results obtained in the treatment of this disease, and I would especially refer to the more conservative and more careful statement of Dr. Pancoast¹ published last year in which he states that "x-ray treatment cannot directly supplant surgery in any instance in which surgical measures are indicated, but there is ample clinical evidence of its value as an efficient adjunct to the latter by often simplifying serious and tedious operations, preventing recurrences, promoting healing in suppurative and serious cases, and frequently greatly improving the cosmetic results."

Malignant Disease. Morestin² describes his technique for the dissection of the glandular structures of the carotid, submaxillary and supra-clavicular regions in operable cases of malignant disease of the tongue and pharynx. He does not believe that the metastatic growth should be removed at the same time as the primary lesion, unless the disease involves the base of the tongue or pharynx, as the risk is too great. The secondary operation should be performed after an interval varying from eight to fifteen days, according to the condition of the patient.

The skin flaps are formed by three lines of incision which meet at a common point in front of the body of the hyoid bone. One line extends from the top of the mastoid process; a second from the symphysis of the mandible; and a third, from the clavicle posteriorly to the insertion of the sternomastoid muscle. The fibers of the platysma should be dissected with these flaps, and the cellular tissues and glandular structures removed in the usual manner in a single large mass. If the enlarged and indurated nodes have contracted close adhesions with the sternomastoid muscle, they should be regarded as infected, and the whole of it, from the mastoid process to the clavicle, removed, care being taken to preserve the spinal accessory nerve. The internal jugular vein may be sacrificed if necessary, but it may be advisable to remove a part of the parotid, one or both of the two portions of the digastric muscle, and the omohyoid muscle; in some operations, resection of the facial, hypoglossal, and pneumogastric nerves and of the external parotid artery may have to be done. Morestin noted that as a result of unilateral division of the vagus in one case, hoarseness developed, while in another the patient suffered from intense tachycardia and severe dyspnea.

Traumatic Lesions of the Atlas and Axis. There has recently been a revival of interest concerning non-fatal injuries to the upper cervical vertebræ. I discussed this condition briefly last year, and find several articles in the literature more recently. Mixter and Osgood³ report

¹ PROGRESSIVE MEDICINE, March, 1910, p. 64.

² Bull. et mém. de la Soc. Anatom. de Paris, 1910, No. 2.

³ Annals of Surgery, 1910, vol. li, p. 193.

seven cases of fractures or dislocation of the atlas and axis, discuss the symptomatology, and give an excellent bibliography.

In general, these lesions result from violence of some sort, although some writers report cases to which muscular action alone has produced the affection. Falls from a height, or down stairs, are the commonest causes, the blow being received on the forepart of the head. The most common variety of injury is a unilateral subluxation or true dislocation unassociated with fracture; the next most common type is a fracture of the odontoid, usually accompanied by rotary dislocations; and the third and less common form of lesion is a fracture of the arches, or lateral masses of the atlas or axis, with or without accompanying dislocations and fractures of the odontoid.

The immediate symptoms vary from almost instant death to a slight rigidity of the neck and asymmetry of the position of the head. As a rule, the symptoms are but slight, pain and rigidity being the most common, persisting for some time. An x-ray picture is of great importance in making the diagnosis, and should always be made on the lateral aspect of the neck. The displacement may be revealed by inspection alone, the disturbed relation of the different spinous processes may be felt, especially by palpation of the pharynx. As Corner originally pointed out, in the rotary dislocations of the atlas two abnormal prominences may be made out, one due to the forwardly displaced transverse process and lateral mass of the atlas on the side of the marked dislocation, and the other on the opposite side and a little lower, corresponding with a portion of the axis which is made more evident by the slipping backward of the atlas. But it is difficult at times to determine positively the integrity of the odontoid.

If a simple unilateral rotary dislocation of the atlas or axis has occurred, intelligent manipulation offers every hope of cure. Mixer and Osgood believe that the method of Walton is the only rational one. "This consists of first freeing the dislocated articular facet of the upper vertebræ from its position. Whether this upper articular process has simply caught on the apex of the process of the vertebræ below, or actually slipped forward into the anterior notch, is a difference only of degree. It should be first lifted free and then rotated into place by the manipulation of dorsilateral flexion followed by rotation. For example, if the left inferior articular process of the axis has slipped forward, and we suppose the patient to be facing the North, we should first bend the head without traction to the East and South, *i. e.*, to the right and backward, possibly rotating a trifle in the direction of the deformity to better free the process. We should then rotate toward the West and North, *i. e.*, turning the head to the left and bending it forward. This uses the undislocated joint as a powerful fulcrum, which is lost if traction be employed as well. It is helpful to remember that the chin will point to the side opposite the main lesion. In a doubtful

case, in which the exact nature of the lesion is not clear and in which we may be dealing with a fractured odontoid, we advise support and fixation by means of apparatus, such as the Thomas collar, or a plaster helmet, until a definite diagnosis can be made. Corner believes that, in cases in which the odontoid has probably been broken, the patient should be kept in bed with the head immobilized for at least three weeks; then an anesthetic should be given, and with an examining finger in the pharynx an attempt at reduction should be made."

The following cases are reported by Mixer and Osgood:

CASE I. Aged fifteen years. Rotary dislocation of the atlas or axis. Fracture of the odontoid. *Treatment:* Manipulation seemed to produce complete flexibility. Six months later, owing to severe occipital neuralgia, a second manipulation was performed and the head supported by a plaster helmet, and later by a high Thomas collar. Symptoms recurred in a week and an operation was performed, the posterior arch of the atlas being sought and exposed. While forward pressure on the anterior arch was exactly through the pharynx, traction was made on the posterior arch, and, after reduction, the atlas was firmly anchored with a silk thread to the spinous process of the axis. *Result:* The boy recovered and has remained well, without symptoms other than slight stiffness of the neck.

CASE II. Aged fifty-eight years. Fracture of the atlas; rotary dislocation of the atlas and the axis on the right. *Treatment:* A Thomas collar was applied, with almost instant temporary relief. High frequency currents were given to relieve the pain, together with general massage, etc. *Result:* One year after the accident the patient has resumed her occupation as a seamstress, wearing a collar much of the time, since it relieves symptoms.

CASE III.—Aged fifty-nine years. Fracture of the posterior arch of the atlas. Probably fracture of the odontoid process. Probably rotary dislocation of the atlas or the axis on the right. *Treatment:* Protection of the neck by means of a supporting collar apparatus. Final relief of symptoms as long as support was worn (?).

CASE IV.—Aged eighteen years. Forward displacement of the atlas. Possible tuberculous disease. The atlas was displaced very far forward, and yet there were no symptoms of cord pressure. *Treatment:* Plaster "Minerva" jacket was applied. Later, a Taylor spinal brace and a chin support were fitted, and in these appliances she left the hospital. *Result:* Eleven months after accident she was still wearing the apparatus, and was free from pain. She cannot hold the head up without some support. The skiagraph shows forward displacement of the atlas still existing. Neither before nor after treatment was any sign of an odontoid process disclosed by x-rays.

CASE V.—Aged nine years. Dislocation of the axis on the atlas. *Treatment:* At first extension and recumbency. Later, Thomas collar.

Two years and eight months after accident was wearing no apparatus. *Result:* Improved position of head, but still holds it to the left.

CASE VI.—Complete dislocation of the atlas on the axis. Fracture of the arches of the atlas and the axis. *Treatment:* Manipulation under ether with head traction and rotation, a plaster helmet for one month. Three months later pain appeared, followed by loss of power in both hands and both feet, and spastic condition of the upper and lower limbs. Laminectomy was performed and the depressed arches of the atlas and axis were removed. Pressure symptoms improved, but four weeks after operation he felt something give way at his neck and became completely paralyzed. Death occurred two days later. No postmortem was allowed.

CASE VII.—Fracture of the posterior arch of the atlas on the right. Rotary dislocation of the atlas on the axis. *Treatment:* Hydrotherapy, high frequency currents, and a Thomas collar. *Result:* There was a gradual disappearance of pain and an increase in the mobility of the head. Pilcher¹ describes the following case, which was under his personal observation for a period of nearly ten years: The man, aged thirty-three years, was precipitated headlong from a ladder, a distance of fifteen feet, striking his forehead. He lost the power to support the head unaided, suffered much pain, and at the end of two months began to be conscious of a growing lack of power in his lower limbs, most marked upon the right side. Three weeks later his right arm and leg became totally paralyzed; there was also paralysis of the bladder and constipation. A laminectomy was performed some weeks later and a forward dislocation of the atlas upon the axis demonstrated. Attempts were made to correct the displacement, but without avail; the wound was closed, and the head, neck, and upper thorax supported in a plaster cuirass. He regained control over his bladder, and later a gradual return of power in the paralyzed leg manifested itself, and also in the arm, but less fully than in the leg. Nine years later he had recovered the use of the lower limb, but only partial use of the arm. The bladder functions were normal, appetite and digestion were good, the bowels were regular, and he was able to walk long distances without much fatigue. There was no motion, either of flexion or rotation of the head upon the neck, the bony ankylosis between the atlas and axis and the atlas and occipital is apparently complete.

Dislocation of a Cervical Vertebra. Hill² reports the case of a man who turned a somersault while playing football, and fell on his neck and shoulder. He did not lose consciousness but suffered from shock, and complained of severe pain in the back of his neck and inability to move the right leg. The grasp of the hand was very feeble, there was

¹ Annals of Surgery, 1910, vol. li, p. 208.

² British Medical Journal, December 25, 1910, p. 1795.

paralysis of the right leg and loss of power in the left. Breathing was diaphragmatic. Sensation was present but retarded. There was priapism and complete retention of urine. Two days later both legs were completely paralyzed, and, on the fourth day, a bedsore developed. Operation was then undertaken and it was found that the spine of the first dorsal was fractured at its base, and the sixth cervical was dislocated forward and firmly impacted. The cord did not pulsate below the lesion until the vertebra had been slipped back into place, after which pulsation was noticeable. On June 2, six months after the accident, his condition was as follows: With the exception of a certain amount of hyperesthesia, sensation was normal. He had complete control over his bladder and rectum. He could walk short distances with the help of a stick, but was somewhat uncertain in the movements of the right leg. The grasp was poor, but he could write a few sentences. The bladder function was normal. Two years later he was much stronger and had recovered the use of his hands; there was still weakness of the right leg.

Cavernous Hemangioma. Intermuscular cavernous hemangioma of the neck is a rather uncommon and interesting affection. Carnett¹ gives the detailed histories of two cases, both of which were successfully operated upon. The first was in a woman, aged twenty years, who presented a tumor the size of a small hen's egg in front of the right sternomastoid muscle, just beneath the angle of the jaw. The overlying skin was normal in color and non-adherent, and the swelling gave the sensation of fluid under slight tension. The diagnosis of cyst, probably of congenital origin, was made, especially as the tumor was said to have arisen twelve years before, following an attack of mumps. There was but little bleeding at operation and, on cross-section, the tumor resembled the erectile tissue of the corpora cavernosa. The second case was in a man, aged twenty-eight years, who had had a swelling of the neck since early childhood. It was rounded, slightly elevated, and extended from the median line to the sternomastoid muscle, and from just beneath the inferior maxilla to a line two inches above the clavicle. The overlying skin was not discolored and not adherent, except at the site of an old scar. Upon palpation, it simulated a fibrolipoma, but could be diminished in bulk by pressure, and promptly regained its original size on relief of pressure. A striking symptom was an enormous increase in size produced, after deep inspiration, by forced expiratory efforts with the mouth and nose closed. Pressure over the course of the internal jugular vein caused a slight enlargement, and percussion over the tumor yielded a tympanitic note. A diagnosis of hemangioma was made prior to operation, which consisted in enucleating the growth, which, though not encapsulated, had

¹ *Annals of Surgery*, vol. li, p. 65.

a distinct line of cleavage from the surrounding tissues. The operation was not difficult and was practically bloodless, seven large veins being encountered at various points along an arc extending from the hyoid bone to the angle of the jaw. Microscopic examination revealed a typical angioma with an admixture of fibrous and fatty tissue.

The clinical course of these tumors varies greatly in individual cases. They may slowly or rapidly enlarge, or may remain quiescent for years, or periods of rapid growth may alternate with periods of slow growth, or the tumor may acutely diminish in size. As a result of traumatism or infection, the tumor may become swollen, hard, tender, and irreducible. Thrombosis may occur, or the blood spaces may coalesce, forming a cyst. In the neck, they originate in the skin, subcutaneous tissues, or intermuscular structures, and tend to extend upward and downward in different planes. When large, they give rise to dysphagia, dyspnea, and dysphonia, when in relation with the trachea, larynx, or pharynx, the percussion note is resonant or tympanitic. They must be distinguished from aërocele, lymphangioma, aneurysm, cysts, hernia of the lung, cold abscess, fibroma, and lipoma. If the tumor is quiescent, or undergoing spontaneous resolution, it may be treated expectantly but should be kept under observation. A continued increase in size calls for active interference. Electrolysis, the injection of coagulating fluids, the introduction of magnesium darts, subcutaneous ligation, and similar forms of treatment, are attended with risk.

Arteriorrhaphy for Aneurysm of the Internal Carotid. McMullen and Stanton¹ report the first case of aneurysm of the internal carotid artery treated by Matas' method. The patient, aged sixty years, for one year had noted pulsation in the right side of the neck and a steadily increasing mass just above the bifurcation of the carotid. The usual physical signs of aneurysm were present. At operation, a saccular aneurysm of the internal carotid was found, arising 4 cm. above the bifurcation, the sac being about 4 cm. in diameter. Crile clamps were placed on the internal carotid above and below the aneurysm, and the sac was opened longitudinally; fresh blood clots were removed and the sac closed by four rows of through and through silk sutures, the first row being so placed as to close the neck of the sac with preservation of the lumen, practically without narrowing. No ill effects were noticed from the temporary compression of the internal carotid which lasted about twenty-five minutes. Two days later decided weakness of the left arm and slight weakness of the left leg were noted, following a period of dulness and apathy. The symptoms improved, although the weakness in the left arm persisted until the eighth day, when the patient developed a sore throat, stiff neck, and fever. On the fifteenth day the patient was discharged apparently well, except for a slight weakness

¹ *Annals of Surgery*, 1910, vol. li, p. 76.

of the left arm. On the twentieth day after operation a large hematoma formed in the neck, and it was decided to reopen the wound and ligate the bleeding vessels. "Under ether, the incision was opened, and immediately there was an alarming hemorrhage. The common carotid was at once clamped, but the hemorrhage came chiefly from above, and all clamps placed on the internal carotid above the site of the aneurysm simply ruptured the friable vessel wall. The hemorrhage was finally controlled by packing, but the patient died within a few hours from the effects of the hemorrhage. Examination at the time of second operation showed that the flaps of the aneurysm sac had apparently sloughed. The secondary hemorrhage came apparently from the junction of the upper end of the sutured aneurysm sac with the internal carotid. No autopsy was permitted."

Ligation of the Internal Carotid for Pulsating Exophthalmos. Halstead and Bender¹ report a case occurring in a man, aged twenty-four years, who, nine months before, had received a severe injury to the left eye. The left internal carotid was ligated near its origin, and when the report was made, three weeks later, a bruit and head noise complained of before operation had disappeared, although the left eye still turned inward; there was some exophthalmos, and the patient occasionally complained of pain. The authors state that the treatment consists in "lowering the blood pressure in the internal carotid artery, which may be done by ligation of the common or internal carotid or by digital compression, the latter being indicated in cases where surgical interference is contraindicated, as in disease or old age." De Schweinitz and Holloway² have written a most extensive and complete monograph on this subject, and I refer to it at this time because it is not mentioned by Halstead and Bender. They record from the literature 150 cases of ligations of the common carotid, with cure or improvement in 97 (64.6 per cent.); failure in 38 (25.3 per cent.); death in 15 (10 per cent.). Since 1900, ligature of the internal carotid has been practised six times, with cure in one case and improvement in four cases, while in one the results were negative (their statistics include 1907). One of the cases reported was my own, and two years and eleven months after the second ligation there was no exophthalmos, bruit, thrill, or pulsation; vision, accommodation, and ocular movements are normal, although the retinal veins and arteries are still slightly enlarged and tortuous. Apropos of the brain symptoms reported by McMullen and Stanton, it might be mentioned that symptoms were observed in five patients after ligation of the common carotid, once after the ligation of the common and internal carotid, and once after the external and internal carotid in 80 cases (de Schweinitz and Holloway).

¹ Surgery, Gynecology, and Obstetrics, 1910, vol. x, p. 55.

² Pulsating Exophthalmos, 1908.

THE THYROID GLAND

Hemorrhages in Goitres. Bruning¹ discusses this complication, and states that hemorrhage may occur in all kinds of goitres, but especially in the colloid and cystic varieties. Severe muscular exertion, direct or indirect external violence, or even severe attacks of coughing, may rupture the thin-walled and degenerated veins, and give rise to the hemorrhage. The clinical symptoms result from the sudden increase in volume and the consecutive narrowing of the trachea, and the pain and tenderness from the sudden increase in tension. When "goitre asthma" suddenly appears, it may be due to an acute thyroiditis, or to a hemorrhage into the goitre. In tracheal catarrh there will be practically no changes in the goitre, and a laryngological examination will disclose the inflamed mucous membrane. In thyroiditis, the absence of trauma, the less sudden onset, the early appearance of fever, redness and edema of the skin are suggestive, but the diagnosis may at times be difficult.

As to *treatment*, operative interference gives the best results, but, if not done, the patient should be placed at absolute rest in the semi-recumbent position, an ice-bag should be applied locally, and he should be given a milk diet, and morphine for the pain.

Syphilis of the Thyroid. Definite syphilitic lesions in the thyroid gland are of great infrequency; twenty cases of gumma of the thyroid having been recorded in the literature. Eight of these were diagnosed clinically without any definite proof of their syphilitic origin, and Davies,² who has recently reported a case and reviewed the subject, discards these. He believes that he has reported the first case of tertiary syphilis of the thyroid gland to be found in the American literature.

Clinically, the syphilitic gumma is almost painless, not adherent to the overlying skin, and does not produce metastasis. It may be firmly adherent to the trachea and larynx, and may cause dyspnea or aphonia. Ulceration may occur; myxedema or hyperthyroidism may result. If of small size, the growth may produce no symptoms aside from the swelling. It frequently is not primary in the thyroids, but is secondary to a syphilitic perichondritis of the cartilages of the larynx.

Partial Thyroidectomy in Dementia Præcox. Last year I³ abstracted a paper by Kanavel in which cases of partial thyroidectomy for dementia præcox were reported, two of which were greatly improved; these were in the early stage. Winslow,⁴ in a recent paper, discusses this subject and believes that operation offers some hope, as there seems to be some connection between the thyroid gland and catatonia. He refers briefly to 5 cases of patients operated upon by surgeons connected

¹ Archiv f. klin. Chir., 1910, vol. xci, p. 614.

² Archives of Internal Medicine, 1910, vol. v, p. 47.

³ PROGRESSIVE MEDICINE, March, 1910, p. 78.

⁴ Journal of the American Medical Association, 1910, vol. lv, p. 1195.

with the University Hospital, Baltimore; of these patients, 1 died from acute thyroidism; 2 were greatly improved for a considerable period and then relapsed into their previous condition; 1 was not materially benefited, and has since been placed in an institution for the insane; and one was improved but has been lost sight of. There is but little literature on this subject, a paper by Kanavel and Pollock,¹ and that by Berkley² being the only others that I have noted.

Therapeutic Dislocation of Hypertrophied Thyroid. Arnd³ reports a case in which the left lobe of a goitre, with the parathyroids, had been removed, but the right lobe continued to compress the trachea, causing dyspnea. It was feared to remove it owing to possible injury of the remaining parathyroids. Accordingly, it was separated from the trachea and pushed through a slit between the sternomastoid and cleidomastoid muscles. The superior thyroid artery was tied in addition.

Exophthalmic Goitre. Rogers⁴ records his experience with the use of specific antithyroid serum in the treatment of exophthalmic goitre. 480 cases, representing all stages and varieties of thyroidal disease, have come under his personal observation. In approximately 15 per cent. the patients have been cured of all trace of their disease; some 10 per cent. have no abnormal subjective symptoms but still retain general signs of goitre, less often the exophthalmos or other indication of their disorder noticeable to the trained observer; about 50 per cent. have been improved to a greater or less extent; about 17 per cent. have failed to show any improvement, and 8 per cent. have died from the natural progress of the disease. By improvement is meant that, after a month or two of treatment, the symptoms have been alleviated, and the patients have then passed from observation and may at present be better or worse than when last seen.

Some interesting pages are devoted to a description of the incipient stages of what later may be exophthalmic goitre. Beginning with a history of more or less prolonged mental and physical strain with an insufficient amount of sleep and rest, the patient complains of over-fatigue, anemia, loss of appetite, constipation, torpid cerebration and irritability of temper. Considerable muscular weakness is next evident, there may be dyspnea upon exertion, and thumping of the overacting heart, most often noted at night upon going to bed. Tachycardia is usually intermittent at first, and occurs after any slight exertion. Throughout the whole progress of events there appears to be a somewhat vague, and yet distinct, connection between the emotions, or central nervous system, and the heart, the vasomotor apparatus, the digestive tract, and in this the liver must be extremely important, and the muscles.

¹ Journal of the American Medical Association, 1909, vol. liv, p. 1675.

² Journal of Insanity, January, 1909.

³ Zentrbl. f. Chir., 1910, Band xxxvii, S. 769.

⁴ Annals of Surgery, 1909, vol. l, p. 1025.

This incipient period may terminate, under common sense and hygienic treatment, in complete or partial recovery, or later may result in typical exophthalmic goitre. It is conceded that the disease may apparently develop suddenly, but Rogers believes that this sudden onset is more apparent than real. Rogers also describes the symptoms of exophthalmic goitre in the early stage, and points out that, in rare cases, it may rapidly pass into the toxemic stage, with high temperature, rapid respiration and pulse, and irregular, tumultuous action of the heart. The dry tongue, nausea, vomiting, and diarrhea present the picture of a septic intoxication resembling malignant endocarditis in some cases, particularly if neither exophthalmos nor goitre is perceptible. In these cases, the involvement of the gastro-intestinal tract is indicated by the enlarged liver, pain in the epigastrium, vomiting, diarrhea, etc., and when death occurs it will be preceded by a high temperature and delirium.

A chronic type is also described, in which the goitre is dense, nodular and hard, and generally shrinks in size. The mentality of the patient is rather wandering, or vague, and of erratic purpose, the patient complains of cold, and the temperature is slightly subnormal; there is loss of appetite, pallor, edema or puffy swellings in the skin and subcutaneous tissue, especially about the face, and a tendency to nose bleeding. Tachycardia, tremor, and nervous irritability become less and less noticeable, except from emotion or fatigue.

It will thus be seen that the disease, exophthalmic goitre, as understood some years ago, is changing in recent years so as to include a profound disturbance of the organs of internal secretion if the disturbance of the thyroid gland predominates. The Mayos have already popularized the term "hyperthyroidism," and it is probable that in time the terms now used to describe this disease will be considered as antiquated.

In discussing the treatment of exophthalmic goitre, Rogers elaborates upon the previous paper published in association with Dr. Beebe. He describes a marked apparent difference in the effect, upon presumably normal individuals, between thyroid nucleoproteid and the thyroid globulin solution, and also the extraordinary number or conditions which seem to be influenced favorably by the thyroid globulin. Beebe isolated the nucleoproteid material of the pancreas, adrenal, and liver, and, when these were injected, it was found that the nucleoproteid material from the liver seemed entirely inert; that from the adrenal lowered the blood pressure; that from the pancreas had no other effect than to produce a very mild catharsis and headache.

Rogers also makes the suggestion that the nucleoproteid from the pancreas is of benefit in diabetic gangrene and, with the thyroid globulin, appears to promote healing and prevent infection in wounds, and might be of great benefit in operations about the mouth, bladder, prostate, or rectum.

In a later paper,¹ Rogers somewhat changes his idea of the function of the thyroid. Formerly he believed that the activating property of the thyroid globulin exerted its effect through the control of oxidation, in which the globulin plays the part of the oxidating enzyme, or, in its ultimate analysis, a substance lying between the oxygen of the air and the hemoglobin of the red corpuscles. He believes this to be too radical a departure from the accepted teachings of physiology until more proof is forthcoming. But it also seems to the reader as though he had been led into new fields by the extraordinarily plausible theory elaborated by Eppinger, Falta and Rudinger, which infers close relationship between the thyroid, the pancreas, and the chromaffin system. The workings of these hypotheses are given by Rogers in his paper, and it makes very interesting reading, but, unfortunately, some of the findings of the above-mentioned experimentors have not been corroborated. The theory, therefore, cannot be accepted as yet.

Kostlivy² writes interestingly upon a research conducted to ascertain whether the true and incomplete forms of exophthalmic goitre are different entities. He has carefully examined 42 patients with thyroid disturbances, 9 of which had pronounced exophthalmic goitre; he recorded the blood picture, the hemoglobin percentage, leukocytosis and coagulating time, dilatation of the pupil after instillation of epinephrin, and tested the blood removed for epinephrin content. He believes that there are two distinct types of chronic intoxication from perverted thyroid functioning. A primary one, depending upon the sympathetic system, predominating during the exacerbations; a second, or vagus type, predominating during the remissions, and being more of a secondary compensating process, although it may assume the predominance in time. He makes one exceptionally important observation, *i. e.*, that there may be isolated patches in the thyroid which are diseased, while the balance may be sound. If the lobe of the thyroid, removed in the usual operation of unilateral thyroidectomy, happens to be sound, we then have an explanation of those cases in which acute symptoms of hyperthyroidism developed after operation. He quotes such cases from the literature, and reports two of his own. He advises abstention from operation in all cases of exophthalmic goitre in which extreme lymphocytosis and slight epinephrinemia indicate that the thyrotoxic poisoning is the work of small patches of abnormal tissue in the gland, while the main part of the thyroid is in a vagotrophic compensating hypertrophy. Strumectomy, in such a case, is liable to be followed by serious acute hyperthyroidism, almost inevitably fatal. This assumption of a disturbance in the coördination of the vagus and sympathetic elements as a basis of the "thyrotoxicoses" suggests the possibility of

¹ *Annals of Surgery*, 1910, vol. li, p. 145.

² *Mitteil. a. d. Grenzgeb. d. Med. u. Chir.*, 1910, Band xxi, S. 650.

successful serotherapy, giving a hypothyroidism serum or hyperthyroidism serum as indicated in the individual case. This individualized serotherapy might prove useful also as a supplement to operative treatment. In conclusion, he urges not to restrict operative measures to the severest cases, and postpone them until after failure of all internal treatment. The incipient thyrotoxic disturbances are most amenable to surgical treatment and give the best results, as the primarily affected parts are removed before they have had a chance to do irreparable damage. Later than this, the outlook is far less encouraging, on account of the changes induced by compensating processes, not only in the thyroid itself, but in the other ductless glands coördinated with the thyroid or antagonistic to it.

Graves' disease was also the subject of discussion at the meeting of the British Medical Association last year, and was discussed by many of those in attendance. The opening paper was read by Prof. Kocher.¹ While he does not offer anything that is new or startling, yet he emphasizes many points which are of great importance. He reported that he had operated upon 469 cases of Graves' disease, with a mortality of 3.4 per cent. He makes the point that, in his paper of four years ago, his mortality was reported as 5 per cent.; in the 155 cases of Graves' disease included in the 4000 of all his goitre operations, the mortality was 2.5 per cent.; and in the 72 cases of Graves' disease operated upon from January 1, 1910, to July, 1910, only one patient died, a mortality of 1.3 per cent.

He again emphasizes the great importance of a *blood examination in making a diagnosis of exophthalmic goitre*, and states that, in doubtful cases, he is not willing to accept the diagnosis if the blood test does not give a positive result, unless the other signs of the disease are sufficiently well marked to make the diagnosis clear. He cannot admit that we may identify hyperthyroidism with Graves' disease, or go so far as to find an indication for an operation in the simple fact of the existence of signs of hyperthyreoses.

The importance of the lymphocytosis and decrease of polynuclear cells, in the diagnosis of Graves' disease, is somewhat clouded by the findings by Miller,² who found analogous changes in the blood in cases of simple goitre. Werelius³ examined the blood in 100 goitrous Chicago dogs and found nothing characteristic in the blood picture, except in the colloid goitres in which higher polymorphonuclear and a lower lymphocyte count was found.

On the other hand, Bühler⁴ examined 20 patients with pronounced goitre, and 70 patients with an atypical form of the disease, and found

¹ British Medical Journal, October 1, 1910, p. 931.

² Mediz. Klinik, 1910.

³ Surgery, Gynecology, and Obstetrics, 1910, vol. xj, p. 152.

⁴ Münch. med. Woch., 1910, Band lvii, S. 1010.

a pronounced relative lymphocytosis in nearly every case. He states that negative findings are not conclusive, but regards the sign as an important differential one.

Kocher also believes that the blood test is a valuable indication of the progress of a case toward recovery, because, when we have arrived at complete cure, the blood becomes entirely normal in every way. Another test, which he believes promises to be of great value, is the determination of the index of coagulation of the blood. Kottman and Liksky examined 37 of Kocher's cases of Graves' disease and found that 29 gave much slower coagulation, 2 gave normal coagulation, and 6 gave quicker coagulation. Of the cases in which the coagulation was normal, one had already been operated upon a year before, with excellent result; the others were operated upon two months before the blood was examined. Out of the 6 cases in which coagulation was found to be quicker, 2 had been under treatment for a long time with phosphate of soda in large doses, and 3 of the cases were particularly severe ones. They used an instrument, invented by Kottman, called a "coaguloviscosimeter." The same investigators examined a series of 8 cases of spontaneous myxedema and cachexia strumipriva after operation, and found the rapidity of coagulation to be greatly increased. This result did not depend upon any great change in the blood count. In one case, after transplantation of thyroid gland into a bone (Kocher's method) and after introduction of thyroid extract by mouth, the coagulability change from commencing at four minutes before treatment to ten minutes afterward, and from ending at six minutes to sixteen minutes after treatment. They also examined 11 cases of ordinary goitre, and proved by the coagulation test that ordinary goitre is, as a rule, combined with a certain degree of hypothyreosis.

Kocher next calls attention to the occurrence of "iodine Basedow," *i. e.*, an artificial Graves' disease evoked by the administration of iodine, by mouth or subcutaneously, to nervous patients affected with goitre. If the iodine treatment is persisted in for too long a time, the patient may die under the same circumstances as in spontaneous Graves' disease, especially with heart failure.

In discussing the contraindications to *operative interference*, Kocher considers that such contraindications are usually due to failure to advise operation upon the patient at an early time. Chronic nephritis, enlarged thymus, glycosuria, etc., are considered as contraindications.

In the discussion of Kocher's paper, Barling thought that cases of Graves' disease coming to the surgeon should be divided into two groups: First, those who suffered in the first instance from ordinary goitre, and in whom eventually the nervous phenomena of Graves' disease supervened; second, those in whom the nervous symptoms predominated from the first, the condition of the thyroid gland attracting, at all events from the patient, little attention. In the first group, excision of half

or more of the enlarged thyroid should be done, while in the second group he had confined his operations to ligation of the vessels. Spencer reported 3 cases in which relief was obtained by division of the isthmus, cutting out a small portion and pulling the lobes apart.

Mayo¹ states that of 580 patients suffering from exophthalmic goitre which have been operated upon, 225 were ligations of the superior thyroid arteries and veins. The mortality was 2 per cent. in deaths occurring within a few days, and 10 patients were operated upon too late and did not improve, but continued in their downward progress, dying in from eight to ten months later of their disease.

In cases of ligation without thyroidectomy, the results were as follows: Slight improvement, 9; great improvement, 44; very marked improvement, 11; absolutely well, 4; cases of questionable exophthalmic goitre, no improvement, 9. Sixty-two patients gained an average of twenty and one-half pounds in three to five months after operation. In most of these cases the ligation is made in a definite step in a graduated operation to reduce the excessive secretion of the gland, and some of these cases are yet to be operated upon for the removal of part of the gland as a secondary procedure. Mayo believes that ligation is indicated in those cases with limited symptoms of hyperthyroidism, and before the eye symptoms or goitre are present; secondly, in the larger group of acute, severe exophthalmic goitres, and in the chronic and very sick patients suffering with various secondary symptoms. The operations of particular value are in those cases with a marked pulsation and peculiar thrill of the thyroid arteries. In discussing the technique of operation, Dr. Mayo states that the incision should cross the central part of the thyroid cartilage and be made in a natural skin crease if possible. The omohyoid muscle is elevated upward and inward, and beneath it is the upper pole of the gland. The thyroid arteries and veins are ligated close to the pole with linen. The after-treatment is the same as for other operations in exophthalmic goitre.

Jackson and Eastman² write an interesting paper on the present status of the *treatment of exophthalmic goitre*, and especially from the *medical point of view*. They insist upon the necessity of treating the patient medically for three months, and if, at the end of that time, no improvement has taken place, a surgical operation, preferably ligation of the vessels, may be done. They emphasize the fact that the medical treatment of exophthalmic goitre is the treatment of myocarditis; in the early stages, by prophylactic measures, we try to prevent its occurrence; in the late cases, we try to remove its cause; and, in very late cases, we try to palliate the existing condition and save what heart muscle is left. Absolute rest and exhibition of the neutral hydrobromide

¹ Annals of Surgery, 1909, vol. 1, p. 1018.

² Boston Medical and Surgical Journal, 1910, vol. clxlii, p. 419.

of quinine are the means most relied upon to rest the heart and to diminish the thyroid activity. They do not agree with the opinion of some surgeons that *diagnosis is the indication for operation*, but believe that such an opinion should be considerably modified in view of the success of medical treatment in a good percentage of cases. When the goitre is compressing the trachea or esophagus, and especially in those cases of "dipping thyroid," operation should be performed; it is also indicated when exophthalmos, by preventing closure of the lids, endangers the eyesight through corneal ulceration, or when, after three months of good medical treatment, there is no marked improvement in the tachycardia or in the patient's general health, or there is an increase in the intoxication by thyroid secretion, even though no enlargement of the thyroid can be demonstrated. "Cases with beginning cardiac involvement, *i. e.*, myocardial weakness, as shown by a pulse of 130 to 160, or one that suddenly fluctuates in tension and rate, should be operated upon at once in order to save the heart, while in cases that have gone beyond this point, and have arrived at the stage in which the myocardium is badly diseased and the aggravating symptoms of exophthalmic goitre are still present, operation must be considered a last resort, not expecting a cure, but merely as an effort to prolong life by taking strain off the heart."

They believe that the presence of an enlarged thymus may be a contraindication to operation owing to the fact that, in the majority of cases where death has occurred from exophthalmic goitre and a post-mortem been performed, an enlarged thymus has been found. Another contraindication to operation is an acute exacerbation of the symptoms; this should be treated with rest, baths, and sedatives, until the symptoms subside. If there is dilatation, marked hypertrophy, or marked carditis, operation should be avoided, and *it is poor judgment to advise operation in any desperate case.*

In the discussion of this paper, however, Jackson stated that, in spite of Capelle's statistics, he was inclined to advise operation in those cases in which an enlarged thymus was suspected, because it is impossible to say for a certainty whether the case is one of persistent thymus or whether it is a normal thymus and a bunch of fat; one had better take the chance of sudden death and have the operation than to go on and have the same advanced symptoms of exophthalmic goitre. He also makes the pertinent remark that, in discussing the cure of a patient, we ought to say "cured to date," because we do not know when any one may relapse.

Frothingham¹ outlines his views as follows: "For patients who can afford it, try properly conducted rest, proper hygiene, and simple medication. If no improvement occurs, conduct a short trial of serum,

¹ Boston Medical and Surgical Journal, 1910, vol. clxii, p. 591.

Röntgen ray, or electricity. If, after prolonged and well-conducted medical treatment, no improvement occurs, or if the case is progressing unfavorably, consider operation. Do not wait, before considering operation, until organic changes have occurred in other organs, especially the heart. For patients who cannot afford proper medical treatment, try the best non-surgical treatment possible along the above lines. If, after a short trial, no improvement occurs, or the patient becomes worse, advise surgical treatment. After the surgical treatment, insist upon a long course of the best medical treatment possible under the individual circumstances."

Porter¹ gives his views as to the treatment of exophthalmic goitre in the following words: "Medical treatment should always be tried first, its duration to depend upon the degree of improvement and upon the circumstances of the patient, as regards ability to rest. In the poorer classes, operation, in spite of its dangers, should be done earlier, as it offers hope of quicker improvement. When tumors are present in the gland, operation should be done early in a quiescent period. Relapsing cases should probably be operated upon; if each succeeding relapse leaves the patient at a lower level, surgery is indicated before chronic myocardial and vascular degeneration make the case incurable. Severe chronic exophthalmos is an indication for operation. In very acute Graves' disease, after the usual treatment, Rogers' serum, if obtainable, should be used. If no improvement takes place shortly, a minor operation under cocaine, with ligature of arteries or veins, should be done in the majority of cases."

It will thus be seen that the internist and the surgeon are nearly alike in their idea of what constitutes the indications for operative interference, each leaning a little to his own views. Porter also gives some excellent advice as to what constitutes a permanent cure. He says that "too little distinction has been made between the purposes sought by operation. In the first instances, the surgeon may really cure the disease by radical removal; in the latter, all that is actually attempted is to modify the functions of an overactive gland. After all the ligature operations and even parital thyroidectomy, enough thyroid tissue is left behind, which, if it hypertrophies or the patient is subjected to the same influences which brought about the original disease, may again become overactive and cause a recurrence of symptoms. If this conception of Graves' disease be a correct one, the physician or surgeon must be careful in promising permanent cures, and he need not be surprised, if examination is made with sufficient care, to find that many cures should be more properly ranked as permanent improvements. If the patient survives partial thyroidectomy, it is obvious that there will be less risk of recurrence than if the patient is treated medically, for

¹ Boston Medical and Surgical Journal, 1910, vol. clxiii, p. 428.

there is less thyroid tissue by which toxins may be produced. On the other hand, as a proportion of these cases, through involution, go on to thyroid sclerosis or colloid degeneration, the danger of the development of postoperative myxedema must be considered if too much thyroid tissue is removed by surgery."

Crile¹, reports the *postoperative results* in a total of 278 operations upon the thyroid gland. Of 15 malignant tumors, the diagnosis was made or suspected in 13, and all of these died either as operative deaths or as recurrences. In 2, one a sarcoma and one a carcinoma, malignancy was found in the routine pathological examination, and was not suspected clinically. He believes that carcinoma of the thyroid is at present rarely, if ever, diagnosed in its curable stage, and the occasional cure is accidental.

In discussing the operative technique of benign goitre, Crile states that the postoperative results may be discussed under the headings: Permanency of relief; deformity of the neck; and impairment of function. In his series, all of the benign tumors remained cured, but, in a number of plain goitres, a moderate enlargement of the remaining goitre tissue was observed, in two cases requiring a second operation. As a rule, the scar is scarcely discernible and, if unsightly, is usually due to the vertical arms of the incision, or by the stitch-hole marks. These factors may be avoided, and, with the exception of some asymmetry, the scar becomes imperceptible. He notes that, although he has never divided the inferior laryngeal nerve, there has been, in virtually all cases, an immediate voice impairment, sometimes amounting to an aphonia. The hoarseness may continue for several weeks or months, but in no instance has it remained permanent.

In discussing Graves' disease, presenting as it does numerous complex symptoms and involving many organs as well as the most fundamental vital processes, Crile was impressed with the great, almost unsurmountable difficulty of compiling any statistical table that accurately represents the net clinical results. In operations for trifacial neuralgia, the pain either does or does not disappear; for hernia, it relapses or it does not; for cancer, it recurs or it does not; but in Graves' disease, every tissue and organ of the body is, in some degree, affected; not only affected, but in varying degrees, and in convalescence there is a marked inequality both as to time and degree of improvement expressed by phenomena both tangible and intangible. There are even rhythms of these phenomena.

A. Kocher² discusses the cases of exophthalmic goitre from the Kocher clinic, 76 per cent. of which were cured, and goes into some detail regarding the 20 cases in which operation failed to cure. In some of these, recurrence of the goitre, in others, secondary lesions of other organs,

¹ Lancet Clinic, 1910, vol. ciii, p. 155.

² Münch. med. Woch., 1910, Band lvii, S. 690.

and, in the remainder, a tendency to hysterical manifestations interfered with the cure. He believes that the best external treatment is a stay at an altitude of from 3000 to nearly 5000 feet, mild hydrotherapy in the form of cold sponging and bathing, and regulation of the diet, the rest cure, phosphorus, arsenic, and iron internally.

NEUROPATHOLOGICAL CYTOLOGY OF EXOPHTHALMIC GOITRE. Crile¹ records some interesting observations regarding the alterations observed in the brain cells of a patient who died from Graves' disease, without any known complication, and was autopsied within two hours after death. This patient was extremely emaciated, ran a continuous fever, had tachycardia and great excitability, gastrointestinal disturbances, exophthalmos, and goitre. The cells of the cortex, cerebellum, and medulla showed changes varying from slight loss of chromatin to total destruction of many cells. Crile also records some observations of the brain cells of frightened rabbits; they were distinctly altered as to size, as to nuclear plasma relation, and as to the chromatin. He concludes that these changes are of importance in estimating the ultimate surgical risk in certain operations, and indicate that, in a case of Graves' disease, the brain cells would be further damaged by infection, by hemorrhage, by shock, and by fear as by the administration of thyroid extract or by psychic stimuli.

CERVICAL SYMPATHECTOMY. Jaboulay² reports 28 cases in which he resected the cervical sympathetic; 23 survived the operation, and 5 of these died from some intercurrent disease after great improvement in the symptoms. Of the remainder, 11 have been lost sight of, and 7 have been under observation for from eight months to twelve years, the cure being complete, except for slight tachycardia upon exertion. It will be remembered that this surgeon was one of the earliest advocates of this method of treatment and his published results justify the statement that the clinical, as well as the experimental, evidence shows that this operation should be abandoned as a routine treatment for exophthalmic goitre. Jaboulay does state that sympathectomy is indicated in recent active forms of the disease and in those cases in which there is no enlargement of the thyroid, but I think that, in the early acute cases and in the forms without enlargement, ligation of the vessels will be the better procedure.

The Thymus Gland. Last year I referred to the subject of sudden death under anesthesia, and discussed the relation of enlargement of the thymus to this accident. While status lymphaticus has not received much attention recently, the thymus gland itself was the object of several splendid and complete pieces of research. It is not possible to discuss these articles fully owing to their length and the abundance of material which they contain, but I may give a few details from the

¹ *Annals of Surgery*, 1910, vol. li, p. 753.

² *Lyon Chirurg.*, 1910, vol. iv, p. 225.

most important of them. Thus, Pappenheimer¹ offers a critical, histological study of the thymus based upon the recent valuable contributions to the literature and extensive personal observations. He found that the thymus grows steadily, throughout childhood up to the period of puberty, reaching the height of its development at or about the fifteenth year. From the time of puberty onward, the gland normally undergoes involutional changes, at first rapidly, later more slowly. As a certain amount of thymus parenchyma remains, even in senescence, we have the right to assume that even in adult life the thymus plays a part in the economy of the body. The lymphatic constitution retards the normal involutional changes, so that the maximum development is attained not, as normally, at the time of puberty, but in the third decade. In five cases of "idiopathic" death associated with status lymphaticus, there was nothing which might be considered a typical feature. In none of them did the histological picture suggest a hyperfunctionating gland, or afford any basis for the theory that the sudden death in these cases is associated with an excessive secretion.

The presence of a so-called "persistent" thymus in the majority of cases of exophthalmic goitre has been blamed for the sudden deaths occurring during or immediately after operative interference upon the thyroid by Harte, Capelle and others. Pappenheimer believes that the thymus in these cases has undergone a renewal of growth, rather than "persisted" in its infantile condition.

Cocks² reports 10 cases of *status lymphaticus with autopsy*. He believes that the diagnosis of this affection is made too frequently, the normal cause of death being shock, anesthesia, and infectious diseases aggravated by the hypertrophied thymus. Status lymphaticus should be suspected when there is a history of one or more sudden unexpected deaths in the family; when there is a pasty skin, a large amount of subcutaneous fat, evidence of old or recent rickets; scanty condition of the axillary and pubic hair, and sign of infantilism in adults. There is generally an enlargement of the lymph nodes, a hyperplasia of the tonsils, and a hypertrophy of the spleen. Blood pressure is low; a lymphocytosis is usually present and the physical signs of the enlarged thymus may be apparent to percussion or by the x-ray.

A number of articles dealing with the *experimental removal of the thymus* have appeared, the most extensive of which is that by Klose and Vogt³ who not only recount the details of their research on animals but also collect the literature, twenty pages being devoted to the bibliography. They operated on puppies ten days old and found that, after removal, symptoms suggesting an acid intoxication occurred, presumably from the nucleic acid, and a deficiency of lime, with resulting

¹ Journal of Medical Research, 1910, vol. xxii, p. 48.

² New York State Journal, 1910, vol. x, p. 325.

³ Bruns' Beiträge, Band lxix, S. 1.

changes in the bone and brain. Partial removal of the organ during its most active phase of existence, or complete removal during the phase of involution, did not seem to cause permanent injury. Nordmann¹ removed the thymus in the third and sixth week of life by means of Meltzer's method of positive pressure and found that, when the animals came to autopsy, the entire heart was enormously dilated without hypertrophy. This observation is important in view of the possibility of using intratracheal insufflation for the anesthesia in the human being, the method being a necessity in operations upon the thymus in animals, owing to the delicate nature of the pleura and the danger in inducing pneumothorax. Nordmann accepts the suprarenals as the antagonists of the thymus, while Klose suggests that the spleen acts vicariously with the thymus. Lucien and Parisot² studied the effects of thymectomy in rabbits and found changes in the weight and dimensions of the bones, and also a diminished growth of the ovaries and testicles.

THE THYMUS FROM THE SURGICAL STANDPOINT. Zesas³ finds that there have been 21 operations performed on the thymus that are on record. Of these, 16 were cured, 2 improved, and 3 died, and no untoward by-effects were observed in any case. He is a firm believer in the association of enlarged thymus with exophthalmic goitre and believes that thymectomy should precede strumectomy. Veau and Oliver⁴ have performed thymectomy in 4 cases without fatality.

Veau⁵ describes the symptoms of hypertrophy of the thymus and its surgical treatment. Dyspnea is the first symptom, and may be congenital or develop within the first few days after birth, may be permanent or intermittent, and includes paroxysms of suffocation. Laryngeal stridor in the newborn accompanies this dyspnea. There is retraction of the abdomen and the supersternal space during inspiration. The attacks frequently come on during the night, and the child starting from sleep with inspiratory stridor rapidly develops cyanosis and dyspnea, which soon pass off when it sits up, but recur as it goes to sleep again. If the thymus is hypertrophied, it may be felt in the supersternal notch, most distinct in coughing and during expiration; percussion reveals a triangular patch of dullness with the base upward and the apex at the level of the second rib. The x-rays may distinguish the shadow from the more rounded shadow filling up the pulmonary hilus in the case of enlarged thyrobronchial glands.

If the child suffers from permanent dyspnea, from paroxysm of suffocation, and from stridor, surgical interference is necessary and the

¹ Archiv f. klin. Chir., Band cii, S. 946.

² Archiv. med. exper. et d'anat., 1910.

³ Deutsch. Zeit. f. Chir., Band cv, S. 180.

⁴ Presse méd., vol. xviii, p. 257.

⁵ Journal des praticiens, December 11, 1909.

gland should be extirpated. Veau describes the technique as follows: The incision is made vertically in the median line, varying in length according to the individual case, but ending about one-half inch below the supersternal notch. The middle line between the sternocleidomastoid muscles is sought and divided, and the two sternothyroid muscles also separated; there is then exposed a thick layer of fascia covering the anterior aspect of the trachea, and in the midst of which is seen a movable grayish mass, rising and falling with respiration and slightly movable from side to side. When this fibrous covering is divided, the gland is easily enucleated and separated from its capsule. The immediate results of operation are excellent, and Veau states that so far only one case of rickets has been observed, a few years after operation, which was eventually cured.

D'Oelsnitz¹ also discussed the symptoms and physical signs of enlargement of the thymus as observed in six cases. He states that the suffocating breathing differs from that of croup in that the chest changes its shape during inspiration, the sternum protruding, the transverse diameter diminishing, and the circumference below increasing. The author believes that the protuberance of the chest at the manubrium and first two costal cartilages on the right side is an important sign.

X-RAY TREATMENT. Rachford² discusses the physiology of the thymus as deduced from the result of x-ray treatment of status lymphaticus in 2 cases. No portion of the body was exposed to the influence of the rays except that which directly holds the thymus gland. The following resulted: (1) Decrease in size of the hyperplastic thymus, with the disappearance of the cough, stridor, and asthma. (2) Decrease in size of the enlarged spleen and lymph nodes. (3) The exhaustion and general feebleness of constitution gives place to normal conditions of health and strength, and physical and intellectual growth are greatly stimulated. (4) A rapid disappearance of the marked lymphocytosis which characterizes this disease. (5) Excessive physiological action of the thymus is controlled.

The Parathyroids. Very little has been written during the last year about these glandules which is worth reporting. A few cases have been added to those on record of transplantation of parathyroid tissue curing tetany. Danielsen³ reports a case in a woman, aged fifty-one years, with threatening postoperative tetany after thyroidectomy. Two parathyroids removed from other patients were transplanted, a few moments after their removal, into the abdominal wall between the fascia and the peritoneum just above the umbilicus. A few severe convulsions occurred after the transplantation, but seven months later the patient

¹ Presse méd., vol. xviii, p. 260.

² American Journal of the Medical Sciences, 1910, vol. cxv, p. 550.

³ Bruns' Beiträge, 1910, Band lxi, Heft 1.

was in an approximately normal condition. Schneider¹ observed a case of tetany following removal of the thyroid gland for sarcoma. Powdered parathyroid gland from the horse was given, and an unmistakably favorable effect was observed. The patient succumbed later from the progress of the malignant disease.

The discussion upon status thymicus and sudden death is made interesting by the observations of Grosser and Betke,² who state that a destructive process in the parathyroids may be the only autopsy finding in cases of sudden death. They support these observations by reports of four cases.

THE BRAIN

Brain Tumors. The surgery of intracranial tumors has been so frequently discussed in the medical press and at medical gatherings that the profession should be fairly conversant with its scope and possibilities. In recent years so much has been written of palliation by cerebral decompression that the very much more important aspect of the subject, namely, the radical removal of the growth, has been unfortunately overshadowed. The last contribution of Sir Victor Horsley,³ whom we recognize as the master mind in all matters pertaining to surgical procedures of the central nervous system, is therefore most timely, since it is an arraignment against the all too prevalent delay in discovering the lesion, and in recommending early exploratory operation. The physician, neurologist, and surgeon alike will profit by reading this last contribution of Horsley's, in which he says that the surgery of the last twenty years' experience in the practical treatment of intracranial tumors shows that the time has arrived for a complete reconsideration of the whole subject. He is especially and justly severe in his criticism of the so-called expectant treatment, and more particularly of the use of potassium iodide. Since no known drug is known to have any influence in neoplastic tumors, the classical administration of potassium iodide is merely a ritual, and is not a treatment of the disease at all. By a singular cynicism, the unfortunate sufferer from intracranial tumors is commonly said to receive "expectant treatment." The administration of drugs in intracranial tumors is analogous to the use of opiates in the early days of the management of appendicitis; symptoms are suppressed, but the disease is not cured. The "expectant" treatment implies, usually, that the physician is unable to make a diagnosis, and, for this reason, Horsley believes a very much more painstaking investigation should be made into the history, which often reveals a clean and unequivocal history of intracranial disease of long

¹ Deutsche. Zeit. f. Chir., 1910, Band civ, Heft 4.

² Münch. med. Woch., 1910, Band lvii, S. 2076.

³ British Medical Journal, December 10, 1910.

duration—from one to ten years—and a more systematic examination of the patient for the signal conditions indicative of the early stage of intracranial tumors. Too frequently we see the physician waiting for headache, vomiting, and papilledema, which are not, as Mr. Moynihan would say, the inaugural symptoms of the disease, but, as the expression of hypertension, are indicative of the final stage. I am in absolute accord with the dogmatic and positive view which Horsley takes as to exploratory operation. The latter involves no risk, and in all his cases he remembers but one in which the skull or cortex appeared to be normal when exposed. Every case of progressive motor or sensory paralysis, of intracranial origin, should be treated by exploratory operation, and every case of focalized epilepsy, not definitely proved to be idiopathic, should receive the same treatment; the former representing the destructive, the latter the irritative effect of the lesion. To wait and watch until hemiplegia, hemianesthesia, or hemianopsia is complete is as unjustifiable as the watching of the gradual destruction of a limb by a sarcoma.

Of special interest is Horsley's reiteration of a statement which attracted my attention a number of years ago, that a simple decompression may be followed by the arrest and complete degeneration of a glioma. At that time the statement was based on but one observation, but since that time there have been a few additional cases. Never doubting the accuracy of the observation, I have always been at a loss to find a satisfactory explanation, and hoped that the author might himself venture one; but he still feels that the cases are too few to enable him to draw any conclusion as to the factors which combine to render such a fortunate result possible.

Horsley has not changed his views with reference to the site for decompression; he still maintains that the opening in the skull should be made as near to the lesion as possible, since, if subsequently it be decided to attempt the removal of the neoplasm, no difficulty will arise in dealing with the surrounding cerebral tissue. Routine temporal decompression not only creates this difficulty, but also causes confusion in subsequent attempts to perfect the localization. If the latter be true, and I accept it as such, with no facts at hand to contradict it, we must acknowledge a very strong argument against decompression in the temporal region in cases in which a focal diagnosis cannot be made at the time. While the advantages of temporal decompression are worthy of every consideration, they must be disregarded if by this method we will obscure or render more remote the early localization of the growth.

Decompression has been seized upon by the inexperienced as an operation which they can practice with reasonable safety and with some assurance of at least temporary improvement, but I cannot but feel that this practice has resulted in the loss of many an opportunity of

finding, and radically removing, the growth. The palliative operations, as Horsley says, should be the exception, and free extirpation of the tumor the rule. Only when the tumor is known to be situated in a region from which it cannot be safely dislodged, or where no localization is possible, is decompression the best procedure.

Saenger¹ is a strong advocate of early operation for the relief of choked disk. To obtain the best results, so far as vision is concerned, the operation must be done at an early stage, that is, before vision is much impaired. Too often operation is postponed until optic atrophy is so far advanced that, while some vision is preserved, there is little or no improvement. Lemon² favors, in all serious, doubtful intracranial lesions, early operation, not a simple trephining, but a properly executed decompression operation. The patient is relieved at once of distressing symptoms, and, later on, symptoms may appear which will make accurate localization possible.

Weisenberg³ has observed some eight cases of *brain tumor with exophthalmos*. The tumors were not limited to any one portion of the brain, but were widely distributed. The growths, too, were of all kinds, and the protrusion of the eyes was either bilateral or unilateral. With one exception, in the unilateral cases, the protrusion was on the side of the lesion, and in every instance intracranial tension was extreme. From his observations Weisenberg concluded that: (1) Exophthalmos only occurs in those cases in which the intracranial tension is greatly increased, and where the normal circulation of the cerebrospinal fluid has been directly interfered with. (2) Exophthalmos is produced by direct pressure upon the cavernous sinus. (3) Since unilateral exophthalmos is almost invariably indicative of a lesion upon the same side, it is of some value to the clinician. (4) Where there is a bilateral exophthalmos, the protrusion is almost always greater upon the side of the lesion, or upon the side where there is the greatest degree of intracranial pressure.

Karplus and Kreidl⁴ have found that many portions of the brain, heretofore considered inaccessible, may be brought into view by uncovering an entire hemisphere. If the head of the subject is lowered, the weight of the hemisphere will displace it sufficiently to expose its under surface. In animals this method afforded ample access to the base of the brain. While practised with similar results upon the cadaver, it is doubtful whether the method would be equally satisfactory on the live subject, as the cerebrospinal fluid would probably prevent the same degree of displacement. That very much larger flaps than we ordinarily use may be made has been shown by a number of obser-

¹ Journal of the American Medical Association, vol. lv, p. 13.

² Wisconsin Medical Journal, 1910.

³ Journal of the American Medical Association, vol. lv, p. 23.

⁴ Wien. klin. Woch., Band xxiii, Heft 9.

variations upon monkeys by Werelius and Moorhead.¹ A flap of almost the entire vault of the skull was made with the base either in the temporal, the frontal, or the occipital regions. This gave an unusually liberal exposure without injuring any of the underlying sinuses. To reach a tumor at the base of the skull, Hoffmann² turned back almost the entire roof of the mouth in a single flap. The tumor was easily reached, and there was much less difficulty in restoring the structures to their normal relation than when the incision is made through the middle of the palate.

To control hemorrhage from the edges of the wound and from the osteoplastic flap, Forschütz³ has devised a safety-pin-like clamp, which is inserted through the tissues between the periosteum and the bone at the proposed base of the flap. When this is clamped, it shuts off the blood supply and insures perfect hemostasis. As the incision is made, the entire thickness of the scalp is grasped with his special clamps, which have a rather broad base. Bleeding from the margin of the entire wound is controlled by a succession of these clamps so constructed that the handles do not interfere with the subsequent steps of the operation.

TUMORS OF THE CEREBELLUM. The importance of early operation in suspected cases of tumor is well recognized. The outlook for the complete removal of the growth is, however, not promising; the opportunity for the complete extirpation of the lesion will depend, of course, upon the character of the tumor. The cerebellopontile or angle tumors are, in most instances, inoperable; the contrary is the case with acoustic-nerve tumors. Tubercles of the hemispheres, if accessible, are readily removed, though recurrence is not uncommon. Hildebrand⁴ takes a rather unwarranted gloomy view of the surgery of cerebellar tumors, because in only 17 of 101 cases did the patient recover. To me this seems rather a creditable showing in an otherwise hopeless condition. The cyst he regards as the most favorable lesion for surgical treatment, there being but one in a series of twenty cases which died from the operation. Seven cases survived extirpation of the growth from the cerebellopontile angle, though in only four of these was the extirpation complete. The greatest danger in these cases comes from injuring the fourth ventricle.

Grinker⁵ is disposed to be more optimistic regarding angle tumors, although in each of his three cases the operation was unsuccessful. He is disposed to be less apprehensive about the immediate effects of lumbar punctures in tumors of the posterior fossa. If the precaution is taken

¹ *Journal of the American Medical Association*, vol. liv, p. 12.

² *Zentralbl. f. Chir.*, Band xxxvii, Heft 24.

³ *Ibid*, Heft 8.

⁴ *Deut. med. Woch.*, Band xxxv, Heft 46.

⁵ *Journal of the American Medical Association*, vol. lv, p. 23.

to prevent the fluid escaping too rapidly, the risks of this procedure are minimized, and much benefit may be derived from it.

Cerebral Hemorrhage. Whether patients should be operated upon in cases of cerebral hemorrhage, or not, is still a much disputed point. Franke,¹ however, is a strong advocate of early exploration, especially in those cases in which the hemorrhage has been an acute one and before the pressure from the extravasated blood has brought about any changes in the cortex. It is always difficult to decide at what point the skull should be opened. He approves, I am sorry to say, of puncture of the brain as a diagnostic measure, and, failing with this, resorts to craniotomy without further delay.

Intracranial Syphilis. Much has already been said of the unjustifiability of the persistent use of the iodides and mercury in intracranial tumors. I am glad to see the stand which Horsley takes in regard to the same practice in cases of syphilitic lesions. He asks for proof that a gummatous mass in the central nervous system has ever been cured by medical treatment of any character, and, in the absence of such proof, insists that syphilitic lesions should be extirpated. Not only should the gumma be included among the operable syphilitic lesions, but acute meningitis, chronic pachymeningitis, and chronic cerebritis. Great importance is attached to the effect of 1 to 1000 injections of bichloride of mercury upon these lesions. In all but two of his cases was there striking benefit, even in cases in which the internal administration of mercury had failed. Similarly, in syphilitic optic neuritis, which he believes to be rather a concomitant of meningitis than a local manifestation of the infection, simple bichloride injections on one side will secure immediate and permanent subsidence of the papillitis. This is a striking contrast to ordinary mercurial treatment, which is frequently followed by relapses and a certain degree of optic atrophy.

CRANIAL NERVES

Facial Palsy. I have been surprised to find how few people directly, or at the suggestion of their physicians, have taken advantage of the operative treatment of facial palsy. One would rather have expected that this treatment, so devoid of risk and so full of promise, would have been eagerly sought by those who have this rather unsightly disfigurement. Such, however, has not been the case, and, while I have been frequently consulted as to the propriety of operation, the patient or physician, or both, only in exceptional instances approve of operation.

Hitherto, direct anastomosis has been effected between the stump of the facial nerve and either the entire trunk or a portion of the spinal

¹ Deut. med. Woch., Band xxxvi, Heft 30.

accessory, or, in some cases, of the hypoglossal. Personally, I have favored the latter, realizing that the resulting hemiatrophy of the tongue was anything but desirable. The operation about to be described, in which the descendens hypoglossi is used to innervate the peripheral stump of the severed spinal accessory, overcomes the principal objections to using either the spinal accessory alone or the hypoglossal, and should therefore be preferred.

When the facial nerve is anastomosed to either the spinal accessory or the hypoglossal nerve alone, paralysis of the trapezius and sternomastoid or of the tongue follows. The resulting condition, in Grant's¹ opinion, is only the lesser of two evils. In one of the cases the facial nerve had been severed by a bullet in the space between the chorda tympani and the stylomastoid foramen. Four months after the accident the facial nerve was exposed at the point where it enters the parotid gland, and was then traced back to the stylomastoid foramen. Opposite the angle of the inferior maxilla the spinal accessory nerve was found and traced to its entrance into the substance of the sternomastoid. The hypoglossal nerve and the descendens hypoglossi were then isolated. The facial nerve was cut at the stylomastoid foramen, its stump pulled forward, and the spinal accessory severed at its entrance into the sternomastoid muscle; the stumps of the two were united by an end-to-end anastomosis and the point of suture enveloped in Cargile membrane. The descendens hypoglossi was next cut three-fourths of an inch below the point where the hypoglossal bifurcates, turned up, and joined to the peripheral stump of the spinal accessory. As soon as possible, massage and electricity were commenced. In fifteen weeks there were feeble associated movements of the face and shoulder; in four months voluntary contraction of the muscles at the corner of the mouth; in six months the patient was able to play the flute, and could close his eye; there was no weakness in the function of the arm and shoulder, and only when the patient laughed was there any noticeable disparity in the two sides. The sooner a nerve is united after its division the more satisfactory will be the result. Grant prefers this method to that of splitting the spinal accessory, because he believes that more perfect regeneration is obtained when there is complete end-to-end apposition of the axis cylinders.

Acoustic Nerve. Starr,² in a contribution upon tumors of the acoustic nerve, divides the symptoms into three classes: (1) Those referable to the cranial nerves. (2) Those referable to involvement of the cerebellar peduncles. (3) Those referable to compression of the tracts passing through the pons. Starr has collected 128 cases, between 1905 and 1910, in which an operation had been performed for tumors of the cere-

¹ Journal of the American Medical Association, vol. iv, p. 1.

² American Journal of the Medical Sciences, April, 1910.

bellum and of the acoustic nerve, and the tumor found and removed. Fifty cases in which no tumor was found are not included in his table.

Tumors of the cerebellum removed (Starr): Total, 128; recovered, 76; died, 52. Reported to *PROGRESSIVE MEDICINE*, March, 1905, total, 116; combined series, Starr and Frazier, total, 244; tumors found and removed, 162; recovery of patient from operation and symptoms, 69.

In the pathological examination of 144 tumors of the acoustic nerve, Henschen¹ found 133 to be solitary, and 12 multiple. Of the solitary tumors, most of them being encapsulated and not adherent, could have been removed. The majority were cysts, fibromas, or fibrosarcomas. Because of their physical characteristics and of their comparatively benign nature, these tumors constitute one of the most favorable group for surgical therapy, and recurrences are infrequent. That the acoustic should be the seat of tumors more frequently than any other cranial nerve can be explained, Henschen believes, only on embryological grounds.

Hyperthermia. An interesting study has been made by Jacoby² as to hyperthermia after operations upon the brain. It is well known that after cerebral operations the temperature may rise quite early or, being delayed for some days, may then remain elevated for several days, especially in the fatal cases, and yet at the autopsy no apparent cause is found. Jacoby reports two cases in which, many days after the operation, the temperature jumped to 105° and then, after falling to normal, again rose. This was repeated several times, and the patients finally recovered. In these cases of hyperthermia he found that the patients presented an entirely different symptom complex than one would expect to see with a similar temperature under other circumstances. The patients did not complain, nor did they have the appearance of being ill. Their appetite was good, and they were not depressed, while the pulse in both cases did not keep pace with the temperature. The temperature, Jacoby found, is higher in encephalic lesions than in any other condition, and he is led to hypothecate that these temperature disturbances are the result of functional disturbances of the cortical cells rather than of the so-called special heat centres. The early rise in temperature is not due to inflammation or absorption, as sufficient time has not elapsed for either to become operative. The hyperthermia coming on immediately after a serious trauma is, Jacoby believes, of neurogenic origin, due to direct or indirect excitation of the thermic centres. This is brought about possibly by the absorption of the products of retained blood clots. Therefore it is all important, in all intracranial operations, to secure as nearly perfect hemostasis as possible, in order that there may be no residual blood clots.

¹ *Hygeia Fest.*, 1909, p. 14.

² *Festsch. d. Dent. Hosp.*, in New York, 1909.

The Hypophysis. The role of the hypophysis in surgery is all the time assuming more importance as the function of this organ becomes more thoroughly understood, and as, through recent improvements in the operative technique, it becomes more accessible to surgical intervention. The studies which have been made of the function of the hypophysis by Paulesco and others has recently been augmented by the researches of Crow, Cushing, and Homans,¹ in which they give the results of over a hundred operations upon the hypophysis in dogs. The pituitary body was either partially or wholly removed. After complete ablation, a condition known as cachexia hypophyseopriva developed, and was inevitably fatal. Where only the entire anterior portion of the gland was removed, there appeared, sooner or later, the symptoms of cachexia hypophyseopriva, though in those animals in which the posterior portion of the gland alone was removed no untoward symptoms were manifested.

In a number of animals, after partial removal of the anterior lobe, certain constitutional symptoms were observed, such as a great increase in the adipose tissues, a hypoplasia of the genital organs, and, in certain cases, a polyuria and glycosuria.

In regard to the *relation which acromegaly bears to the hypophysis*, we are still greatly in the dark, for many cases have been reported of pituitary tumors with no symptoms of acromegaly whatever. Woskalew,² in reporting two cases in which, at autopsy, there was found a hypophyseal tumor, and yet during life no signs of acromegaly were present, thinks that we are living purely in the realm of hypotheses as to the connection between the pituitary body and acromegaly. He believes that we must have far more clinical and experimental evidence before this most important question is at all satisfactorily settled, although as far back as 1886, Pierre Marie stimulated interest in this subject by reporting cases with symptoms of acromegaly which later were found to have tumors of the pituitary body.

According to Cushing,³ the pituitary body is best considered as a double organ, inasmuch as the secretion from the anterior epithelial portion of the gland discharges into the blood sinuses which are found traversing this portion of the gland, while the product of the secretion derived from the posterior lobe enters the cerebrospinal space by way of channels in the pars nervosa. The secretion eliminated by the posterior portion of the gland, which has been shown by various injections to possess certain active principles, is, however, less essential to the physiological equilibrium than is that of the anterior lobe, the total removal of which, as previously mentioned, soon results in death. Acromegaly and gigantism he considers to be due probably to a hyper-

¹ Johns Hopkins Hospital Bulletin, May, 1910.

² Virchow's Archiv, vol. ccl, No. 2

³ American Journal of the American Sciences, April, 1910.

activity of the anterior portion of the gland, which alteration may later assume the character of some malignant growth. This theory is upheld by v. Eiselsberg,¹ who shows from his clinical experience in the various diseases of the pituitary that hyperfunction of the anterior portion of the gland does produce acromegaly, while any loss of the function of this portion of the gland is followed by a deposit of fat and certain symptoms of persistent infantilism. v. Eiselsberg divides his various cases into three groups—hypopituitarism, acromegaly, and mixed type. In his first group he places three of his cases, all of which were operated upon, and all of which were cured. In the acromegaly group there were two cases; both were operated upon and died; the one case, of the mixed group, was very much improved by operation.

TUMORS. The *diagnosis of a tumor of the pituitary gland* is not always easy, though with our present knowledge of the function of the gland, derived from experimental observation, it is becoming less difficult. The radiograph in these cases has proved to be almost invaluable, as in the presence of a tumor there is almost always some change in the sella turcica.

In diagnosing these tumors, Hartwell² classifies them under three headings: First, those in which the manifestations of intracranial tension are present; second, those with certain localizing signs; and third, those which have marked pathognomonic symptoms. The most constant symptom is a bitemporal hemianopsia due to pressure upon the optic commissure followed by optic atrophy. Where there are signs which point toward acromegaly, or some lesion of the genitalia, such as infantilism, the diagnosis is more easily made. Hartwell found that in every case of hypophyseal tumor which had come to operation there was either unbearable headache or progressive loss of vision.

There has been considerable advance made in the *technique of operations upon the pituitary*, the older methods not being by any means wholly satisfactory, though a number of cases of recovery were reported. The result of the operation was usually not pleasing, as the deformity left by the operation was most unsightly. The intracranial operation was at one time practised, in order to reach the pituitary either through the anterior or the middle fossæ, but has since been abandoned, chiefly on account of the difficulty encountered in reaching this portion of the brain and the great danger of doing serious injury to the important vessels which are encountered in this approach. The extracranial operation by way of the trans-sphenoidal route was advocated as far back as 1898 by König, the nose being split, the maxillæ separated, thus permitting the removal of the inner walls of the maxillary sinus and the vomer. Although this is the most direct approach to the hypophysis,

¹ *Annals of Surgery*, vol. lii, p. 1.

² *Boston Medical and Surgical Journal*, vol. clxii, 25.

the operation is too disfiguring, and is attended with many difficulties. In Schloffer's method, as reviewed in *PROGRESSIVE MEDICINE* last year, the sella turcica was approached by the superior nasal route. The nose was reflected downward, and after removal of the turbinates and vomer, the sphenoidal sinuses were entered. This method was also used with slight modification in the cases reported by v. Eiselsberg. Kanavel,¹ in endeavoring to simplify the approach to the gland, elaborated what he calls the infranasal route. The unsightly deformity is obviated and but little hemorrhage is encountered, while the danger from infection through the cribriform plate, as in the supranasal route, is minimized. Kanavel makes an incision around the lower half of the nose, taking care to keep close under the nares and to the crease at the alæ in order

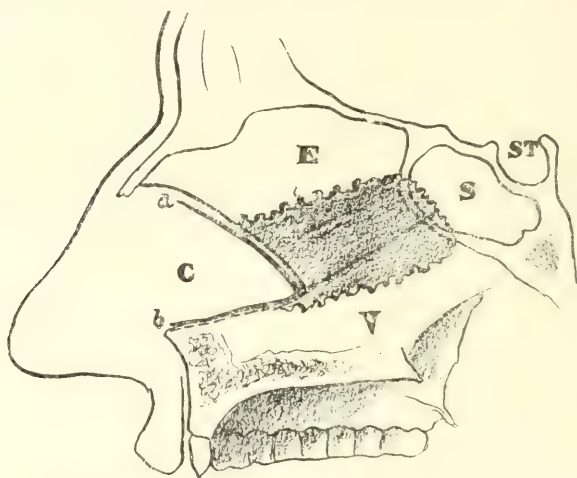


FIG. 1.—Line of incision (*a-b*) for the elevation of the cartilage (*C*). The perpendicular plate of the ethmoid (*E*) and the vomer (*V*) are shown as bitten away, as well as the anterior wall of the sphenoidal sinus (*S*).

to avoid a scar. The nose is then reflected upward, and the septum is cut both at its inferior portion and where it joins the ethmoid. The middle turbinates are then removed, and occasionally it may be found necessary to excise the anterior end of the inferior turbinates. A Fränkel nasal speculum is then employed to hold the septum to one side, and at the same time to keep the cavity open, thus affording an excellent view of the sphenoid. When once the sphenoidal foramina are reached, any interfering attachment of the ethmoid and vomer should be removed. The anterior wall of the sphenoidal cells is removed with a Hajek-Schmithuisen punch forceps, and the tumor thus exposed to view. Kanavel has found a narrow chisel, with the end deflected about 20 degrees, of great assistance in entering the sella turcica.

¹ Journal of the American Medical Association, November 20, 1909.

West¹ has elaborated a method of approach similar to that of Kanavel's, but less radical. The best results, he thinks, are to be obtained when the operation is done in two stages. At the first sitting, West removes the turbinates from both nasal cavities under local anesthesia without slitting the alæ, and at the same time excises the anterior wall of the sphenoidal sinuses and a portion of the nasal septum. This portion of the operation he thinks can hardly be done satisfactorily by the general surgeon, but should be undertaken by the nasal specialist. At the second operation the alæ may be split and the hypophysis reached through the sella turcica. Kanavel and Grinker² report a case operated upon by this method. Upon reaching the sella turcica a tumor was found, and removed by the use of a curette. The bleeding after the removal of the tumor was so severe that the cavity had to be tamponed, another strip of gauze was introduced into the nasal cavity, and both were brought out through the nares. The patient recovered promptly from the effects of the operation, and the cosmetic result, in the absence of any visible scar, was all that one could desire.

Hirsch³ reports a most interesting case of hypophyseal tumor which he removed throughout the endonasal approach. In this case, a woman, aged thirty-five years, the diagnosis was confirmed by a radiograph. The operation, performed in several stages, was done entirely without the use of a general anesthetic, cocaine alone being used. At the first sitting, Hirsch removed the middle turbinate upon the left side, and the ethmoid cells after a lapse of several days. After a short interval he resected the anterior wall of the sphenoid cavity, when the prominence of the hypophysis could be plainly seen. At the next sitting, with a small chisel he removed the bony covering of the tumor, and, in the hope that this would afford enough relief of tension to relieve the symptoms, nothing more was done at this sitting. However, after several days had elapsed without any alleviation, the tissues were again cocainized and the dura opened. An excellent exposure of the tumor mass was thus obtained; the latter was incised, and a considerable quantity of blood-stained fluid escaped. After excising a portion of the cyst wall, the anterior nares were plugged with cotton. The patient was able to walk back to her room, and the postoperative period was uneventful; the symptoms gradually disappeared, and the improvement in her vision was especially noticeable.

Since reporting this case, Hirsch has been endeavoring to develop an endonasal method whereby it may be possible to perform the operation at a single sitting, and has used this method in one case successfully. After rendering the septum insensitive on both sides with a 20 per cent. cocaine solution, it was infiltrated along its entire length with Schleich's

¹ Journal of the American Medical Association, vol. liv, p. 14.

² Surgery, Gynecology, and Obstetrics, April, 1910.

³ Journal of the American Medical Association, vol. lv, p. 9.

fluid. An incision was made down to the cartilage through the mucous membrane of one side along the anterior edge of the quadrangular cartilage; the mucous membrane then was raised with the periosteum from the cartilage and from the bone. By means of another incision, 0.5 cm. from the original, a raspatorium was introduced between the perichondrium and the cartilage back to the posterior border of the septum and the mucous membrane with the periosteum raised upon this side. Holding the membranes apart with a nasal speculum, the bare cartilage thus exposed was removed with a cartilage knife and the vomer and perpendicular plate of the ethmoid resected with bone forceps. Where the mucous membrane of the vomer joins the sphenoid it must be separated from the bone and from the anterior surface of the sphenoid on both sides. Hirsch now removes the posterior part of the vomer, and with a chisel cuts through the anterior wall of the sphenoid cavity. With the hypophyseal prominence thus exposed, there was no trouble in entering the sella turcica.

Halstead¹ reports two cases which he has operated upon for hypophyseal tumor by what he designates the oronasal route, a route in many ways similar to that devised by Kanavel. In the first case, a man, aged thirty-nine years, there was marked frontal headache, bitemporal hemianopsia, and optic atrophy. All signs of acromegaly were lacking, but the patient had noticed for more than a year a diminution of sexual power. The technique employed by Halstead was as follows: A high tracheotomy was performed and a Trendelenburg cannula inserted. Up to this point ether was used, but, for the rest of the operation, chloroform was substituted. Adrenalin tampons were inserted into the nasal cavities and the pharynx. The upper lip was raised, and about five-sixths of an inch from the mucocutaneous junction an incision was made in the mucous membrane, which ran parallel with the alveolar process (Fig. 2). The nose was then gradually drawn up with retractors after the soft tissues were freed. The septum was divided with bone forceps, displaced upward and to one side (Fig. 3). The middle turbinates having been removed in this case at a previous operation, the lower turbinates, the vomer, and the perpendicular plate of the ethmoid were removed (Fig. 4). An opening was then made through the anterior wall of the sphenoidal sinus and a blue-colored pulsating mass was seen. The membrane covering the tumor mass was incised, the tumor removed with a blunt curette, and the cavity flushed with normal salt solution and packed with iodoform gauze. After suturing the septum in place, the wound in the mucous membrane of the mouth was sutured. For the first forty-eight hours the patient was in excellent condition and free from pain; at the end of that time the original packing was removed and replaced with a fresh piece. The temperature rose to

¹ Surgery, Gynecology, and Obstetrics, May, 1910.

105°, pulse to 160, and the patient became somnolent, this condition lasting about twenty-four hours, when the gauze packing was again removed and the cavity irrigated, the temperature began to fall and

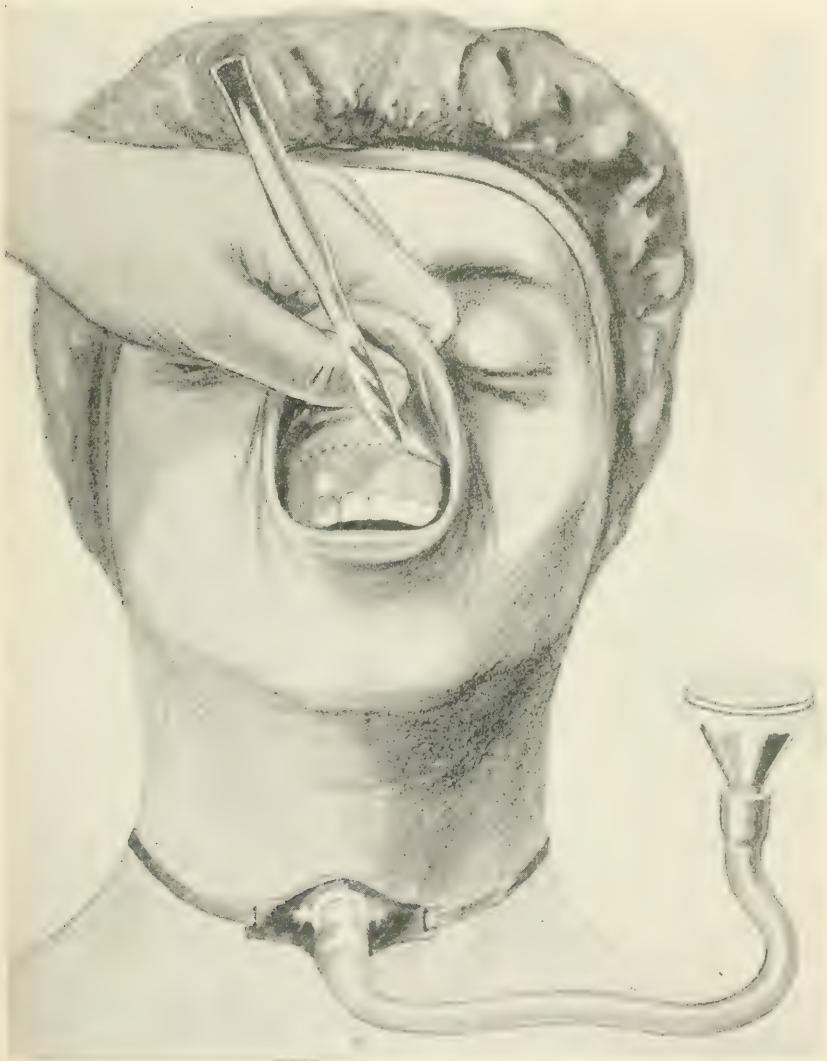


FIG. 2.—Trendelenburg cannula inserted; lip retracted, showing incision in mucous membrane parallel to alveolar process.

the subsequent history was uneventful. Upon leaving the hospital the patient was able to resume his occupation as a driver on an express wagon, he was free from pain, and there was marked improvement in vision. In the second of Halstead's cases, a woman, aged thirty-two years,

the diagnosis was based on headache and vomiting, the presence of bitemporal hemianopsia, optic atrophy, and certain acromegalic changes.

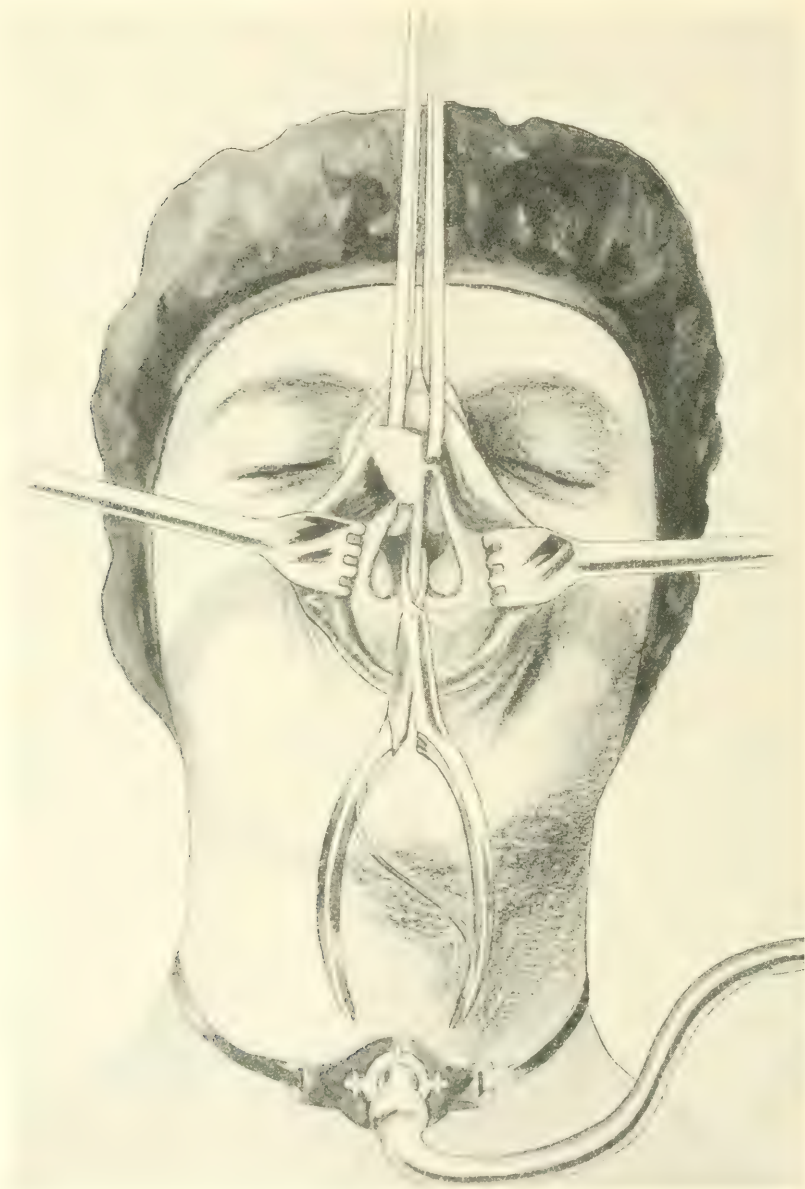


FIG. 3.—Nose and lip retracted after division of septum. Turbinate bodies exposed.

The operative procedure was very similar to that above described. Ten hours after the operation the temperature rose to 105° , and the patient

died the next afternoon; her temperature just before death registering 107.4° and pulse 160. Although no autopsy was allowed, death was

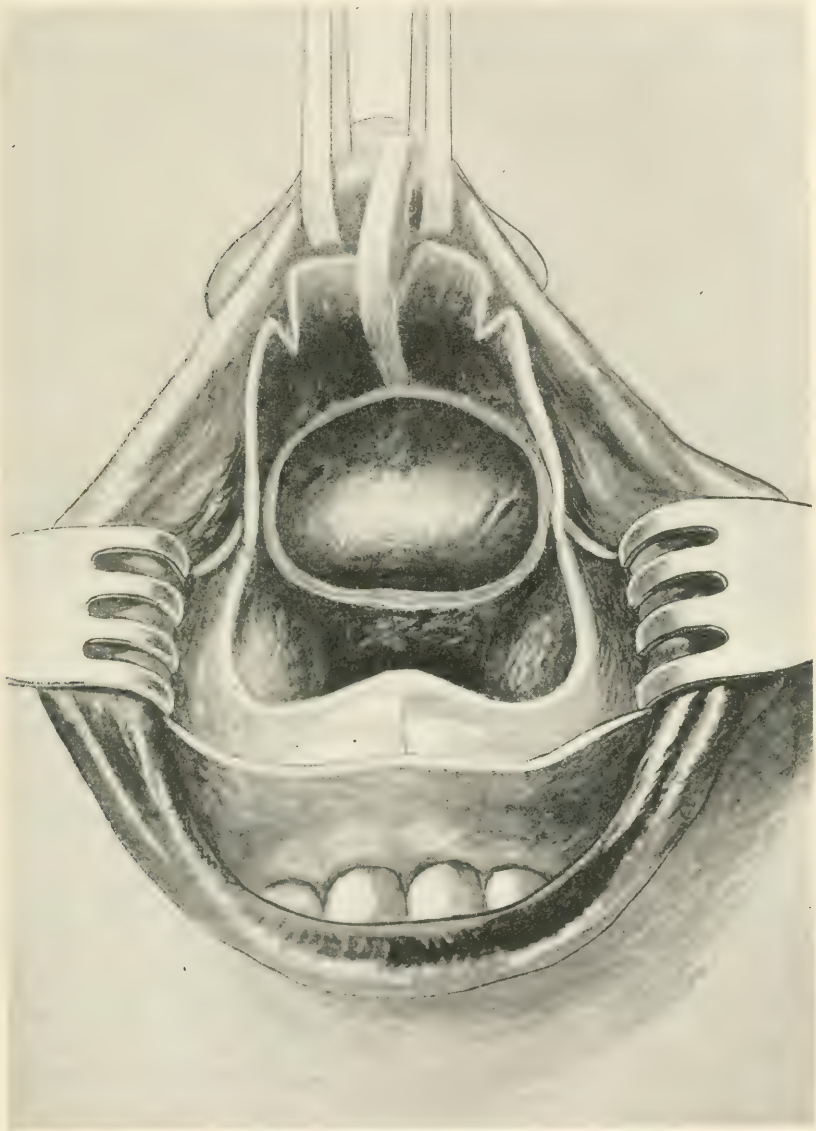


FIG. 4.—Nose and lip retracted over forehead. Through the mouth is seen the nasal cavity after removal of turbinates, bony septum, and vomer. Body of sphenoid exposed.

believed to be due either to some central circulatory disturbance or else to absorption of crushed hypophyseal material.

Another method of approaching the hypophysis has been worked out on the cadaver by Fein.¹ Without making any external incision, the cheek is raised and an incision is carried from the frenum to the last tooth. This is made in the mucous membrane, where the membrane of the cheek passes into that of the alveolar process. Having extended the incision down to the bone, the periosteum is raised until the entire facial wall of the antrum is laid bare. The separation of the periosteum extends to the pyriform aperture, to the infraorbital border, and to the crista zygomatica alveolaris. The anterior wall of the antrum is resected and separated by dissecting off the mucous lining of the antrum; the lateral bony wall of the nose, which forms the median wall of the antrum is exposed. This wall is then removed, either with or without the removal of the anterior portion which forms the lateral boundary of the pyriform aperture. After excision of the lateral nasal wall and the lower and middle turbinates, the ethmoid is removed as completely as possible and the anterior wall of the sphenoidal sinus thus exposed on one side. By removing the posterior portion of the septum, the anterior wall of the sphenoidal sinus on the opposite side is exposed. The sphenoidal cells being removed, the bony covering of the hypophysis is fully exposed, and should be carefully removed in order to expose the tumor. Fein claims for his method a broader exposure than is possible by the Schloffer route, in which the exposure is limited to the breadth of the nose. Other advantages are the avoidance of any wound on the face and the lack of deformity which inevitably results after removal of the nasal septum.

This method, however, seems much more complicated than the one proposed by Kanavel or Halstead, and it is doubtful whether it possesses any advantages over either.

Mixer and Quackenboss² successfully removed a cystic tumor from a patient who had been in good health up to five years before his admission to the hospital, when he began to suffer from headaches and disturbances of vision. A careful physical examination revealed symptoms of infantilism, with scant hair and somewhat infantile genitalia. Mixer followed Kanavel's method, and turned the nose upward after dividing the nasal processes. Upon opening the sella turcica, a cyst containing about one and one-half ounces of fluid was removed. The patient made an uneventful recovery, and Mixer considers the method most simple and satisfactory.

v. Eiselsberg,³ who has had the largest experience in these operations, adds another to the series of cases reviewed in this article last year. This patient had been ailing for about ten years; the symptoms included signs of acromegaly, headache, and insomnia. The operation was

¹ Wien. klin. Woch., Band xxiii, Heft 28.

² Annals of Surgery, vol. lii, No. 1.

³ Ibid., p. 1.

carried out by the same method he employed in his other cases, the anterior wall of the frontal sinuses being temporarily removed. In this case the operation proved to be a simple one and of short duration, but, unfortunately, the patient died three days later of a streptococcic meningitis. Both of v. Eiselsberg's cases, which had symptoms of acromegaly, died, and in each the tumor proved to be malignant.

Hydrocephalus. The normal amount of cerebrospinal fluid found within the ventricular system should amount to but a few ounces, and any excess of secretion should be absorbed by the sinuses within the dura. The subarachnoid spaces form a general system of intercommunicating channels and connect with the ventricles through the foramen of Merkel in the descending horn of the lateral ventricle, through the foramen of Magendie, the foramen of Bichat, and the foramen of Tueclika. The abnormal amount of fluid giving rise to hydrocephalus may be due to hypersecretion of the choroid plexuses and the ependyma; it may be due to diminished absorption from the pacchionian bodies; it may be due to the inability of the lymphatics in the subarachnoid spaces to carry off the excess, or of the ependyma to reabsorb the fluid; finally, there may be some obstruction to the various above-mentioned outlets. The general consensus of opinion, at the present time, seems to be that obstruction is the chief cause in producing hydrocephalus, but Guthrie¹ thinks all three factors—hypersecretion, diminished absorption, and obstruction—play an equally important role. In 182 cases of meningitis which came to autopsy and which had hydrocephalic symptoms, 94 were cases of tuberculous and 88 cases non-tuberculous meningitis. In the 94 cases of tuberculous meningitis, Guthrie found:

	Cases.
Intraventricular fluid excessive in	38
Intraventricular fluid moderate or normal in amount in	17
Intraventricular fluid probably not excessive in	13
Intraventricular fluid absent in	26

Hydrocephalus, therefore, was present in 40.4 per cent., and absent in 58 per cent. of these cases.

	Cases.
In the 88 cases of non-tuberculous meningitis it was found that the intraventricular fluid was excessive in	50
Intraventricular fluid moderate or normal in amount in	8
Intraventricular fluid probably not excessive in	9
Intraventricular fluid absent in	21

In this series, therefore, hydrocephalus was present in 56 per cent., and absent in 43 per cent.

Tumors in any part of the brain may be associated with hydrocephalus, even though they are so placed that they cannot, *per se*, cause any obstruction to the outlet of the ventricles. Owing to the

¹ Practitioner, July, 1910.

increase in intracranial tension, the cerebellum and pons are forced down into the foramen magnum, and thus the escape of the fluid from the fourth ventricle into the subarachnoid space is cut off.

Various *methods of treating hydrocephalus* aim to relieve the pressure symptoms: (1) Lumbar puncture; (2) puncture and drainage of the lateral ventricles; (3) drainage of the subarachnoid space; (4) drainage of the ventricle into the subdural space. Lumbar puncture, in these conditions, owes its success only to the fact that there has been a free communication between the ventricle and the cord. Many attempts have been made to establish permanent drainage through the lumbar canal, but they have not been successful. Lumbar puncture should be frequently practised in the rapid and progressive cases, but not at all in chronic cases. Puncture and drainage of the lateral ventricles may be of great benefit in those relapsing cases in which there is a sudden appearance of pressure symptoms, but in chronic cases in which the brain has become adapted to the cranium, any reduction of tension may be very dangerous, and such cases had best be let alone. Drainage of the subarachnoid space is impossible to maintain without the structures becoming infected sooner or later. Drainage of the ventricle into the subdural space, theoretically at least, is the most rational, and should be the most effective procedure, but in actual practice there are no cures so far as I know.

Kausch,¹ in spite of the prevailing opinion, recommends and uses repeated ventricular punctures, especially in infants. In two cases the results were excellent. From one, an infant of but five months, 3035 c.c. of fluid were removed within forty-four days, thirteen punctures being done. All of the symptoms, including choked disk and exophthalmos, rapidly subsided, and the circumference of the head was reduced from 52.5 to 45.7 cm. As long as the intracranial pressure remains high, Kausch advocates the repeated use of ventricular puncture daily, if necessary, until the skull has returned to its normal dimensions.

Finkelnburg² reports the case of a boy, aged sixteen years, with chronic hydrocephalus which had resulted from an old injury to the head sustained six years before. The symptoms were indicative of progressive compression, resembling somewhat a cerebral tumor, with choked disk, nystagmus, and slowing of the pulse rate. The needle was introduced, near the left motor area, into the lateral ventricle and 20 c.c. of fluid under very high pressure were withdrawn. By the end of a week the ocular disturbances were decidedly better, and the headache and vomiting had entirely disappeared. Three years after the operation the patient was apparently in perfect health.

I mentioned last year Bramann and Anton's method of puncturing the corpus callosum for drainage. In a more recent communication,³

¹ Mitt. a. d. Grenz. d. Med. u. Chir., Band xxi, Heft 12.

² Münch. med. Woch., Band lvii, Heft 36.

³ Med. Klin., Band v, No. 48.

they report 22 cases in which this method was employed with gratifying results. It is advocated especially in those cases in which a decompression might be indicated. The symptoms of intracranial tension, choked disk, headache, vomiting, etc., disappear after puncture, as they do after decompression. Puncture of the corpus callosum is of further service in relieving tension in the hernia established by decompression, or in enabling the operator to close the dural flap in cases with extreme intracranial tension.

Trigeminal Neuralgia. But little has developed in the course of the last year to modify our views regarding the treatment of trigeminal neuralgia. Judging from current literature, alcohol injections are being used so generally that I rather anticipated that the number of cases referred to me for operation would not be as large as heretofore. As a matter of fact, the number steadily increases and there were more last year than in any year preceding. I believe now, as I did shortly after alcohol injections were first proposed, that they would afford only temporary relief, and that many cases of the major type of tic douloureux can be absolutely and permanently relieved only by an operation upon the ganglion or its sensory root.

This statement is made not with the intention of condemning the injection method for all cases, but merely to point out its limitations. Personally, in many instances I resort to this treatment myself, especially in the earlier cases in which the second or third division alone are involved, and particularly in patients who, because of extreme age or advanced arteriosclerosis, are not suitable subjects for the intracranial operation.

We will discuss, a little farther on, the technique of giving the alcoholic injections; suffice it to say at this time that the procedure is not altogether unattended with risk in inexperienced hands, and even in experienced hands difficulties are encountered and failures not infrequent. In order to secure more than temporary relief, the point of the needle must penetrate the nerve sheath so that the alcohol solution comes into immediate contact with the nerve fibers.

Offerhaus¹ has been trying to work out a more exact method of practising the so-called "Schlosser injection," and for this purpose has devised a pair of calipers, which he has found of great assistance in accurately locating the nerve. In a careful study of over sixty skulls in the anatomical museum in Gröningen, Offerhaus has found that the distance between the foramen ovale is, in all cases, equal to the distance between the alveolar processes, if the measurement is made where the process of the palate joins the lower jaw, just beyond the last molar tooth. This may be done by measuring between these two points with a pair of calipers. In addition to this, the distance between the foramen

¹ Archiv f. klin. Chir., Band xcii, Heft 1.

rotundum is equal to the distance between the inner side of the alveolar processes just beside the last molar tooth. The distance between the foramina ovali is also equal to the distance between the outer sides of the maxillary tuberosities and the foramen ovale. The distance between the foramen rotundum and the outer border of the malar bone has the same relation as the distance between the foramen ovale and the outer side of the maxillary tuberosity. It is evident, therefore, that, in order to find how far to insert the needle to reach the second and third branches of the fifth nerve, it is only necessary to know the distance between the two maxillary tuberosities and between the inner side of the alveolar processes. Offerhaus shows that if the distance measured by a caliper on the outside of the skull, between the two maxillary tuberosities, is 14 cm., and the distance between the alveolar processes is 5 cm., the exact distance to be traversed by the needle before it penetrates the third branch at its exit from the foramen ovale is estimated by the following equation $1\frac{1}{2} \cdot 5$ or 4.5 cm. To reach the second branch, the same rule is observed. In making a transverse section through numerous skulls at the articular tubercle, in the majority of cases it was found that the foramen ovale was from 1 to 6 millimeters back of this. There is the greatest difficulty in determining the exact direction the needle must follow after it penetrates the skin. To obviate this difficulty, Offerhaus has devised an instrument which consists simply of a large pair of graduated calipers, the ends of which curve slightly inward, to which are attached, at either end, an adjustable grooved rod. To ascertain the proper direction of the needle, the calipers are applied to the maxillary tuberosities and the distance read off between these two points. It is then removed, and the two rods are adjusted so that they are projected in a straight line. The calipers are once more placed on the maxillary tuberosities and the needle is inserted, using the groove in the rod as a guide, until it has penetrated to a point previously determined by the above equation. At this point the needle should have penetrated the nerve. To reach the second division, the calipers are placed on the malar bone about 1.5 cm. from the junction of its ascending and horizontal processes. The needle may then be introduced either above or below the zygoma; if it is intended to inject the nerve at its emergence from the skull, the needle should be introduced below the zygoma, the needle is directed upward and a little backward, following the direction of the rod on the end of the caliper. It is unadvisable, in these cases, to use a general anesthetic, although the point of insertion may be cocainized. The operator can ascertain only by the patient's sensations whether the needle has penetrated the substance of the nerve. In addition to its application in the treatment of trifacial neuralgia, Offerhaus¹ uses this method to produce

¹ Deut. med. Woch., Band xxxvi, Heft 33.

regional anesthesia in operations upon the face or mouth, except in patients of nervous temperament.

Harris¹ has come to the conclusion that alcoholic injections are indicated only under the following circumstances: (1) When the site of irritation or injury to the nerve is more or less peripheral, so that the nerve can be injected on the central side of the lesion, since no benefit results from an alcohol injection of a nerve below the point of irritation. (2) When paralysis of the affected nerve will not result in extensive muscular palsy. To avoid unpleasant complications, Harris gives the following advice: (1) Never, in injecting the nerve at the foramen rotundum, go to a greater depth than 5 cm. or, as a better guide, do not insert the needle more than 7 mm. past the anterior edge of the external pterygoid plate. Only by observing this precaution will the optic nerve be avoided. If the needle is inserted in a too horizontal direction it will reach the sphenopalatine foramen, and will then be felt in the nose. If directed too high, the sphenoidal fissure may be reached and the branch from the third nerve damaged, causing diplopia and dilatation of the pupil. (2) When injecting the second division at the foramen ovale, if the needle is directed too low or too far, *i. e.*, more than 4 $\frac{3}{4}$ cm., the wall of the pharynx or the Eustachian tube may be punctured. If directed too far back, there is the risk of injuring the middle meningeal artery, and it is possible, if the needle is pointed too far back, to injure the internal carotid artery or jugular vein.

While a mixture of cocaine or chloroform and alcohol has been used in these peripheral injections, it has been pretty generally discarded for 80 or 90 per cent. alcohol, 2 to 3 c.c. for each injection. When the needle actually penetrates the sheath of the nerve, in a very short time one finds analgesia in its peripheral distribution. Even when the injection does not actually penetrate the nerve substance, the pain subsides, at least temporarily, when it will be necessary to repeat the injection in a few days or a few weeks. Leszynsky,² in reviewing the work of the last few years, has found no record of any serious accidents or complications, though the method has been resorted to by many inexperienced operators. There may be some rigidity of the muscles around the temporomaxillary articulation after injecting the second division, and occasionally there is some puffiness and ecchymosis of the face. Great care, of course, should be exercised, in cases complaining of pain in the distribution of the fifth nerve to distinguish between a true neuralgia and the results of pressure or infiltration of a tumor. Weisenberg³ records, in this connection, the experience of a patient who had had innumerable injections and peripheral operations performed for the relief of violent neuralgia, and had even had the sensory root cut.

¹ British Medical Journal, June 11, 1910.

² Medical Record, April, 1910.

³ Journal of the American Medical Association, vol. Ivii, No. 20.

Finally, at necropsy, a tumor was discovered, deep in the cerebello-pontile angle, which, by pressure, had been the source of all his pain. During the five years in which the patient had been under observation, the continued absence of any pressure phenomena caused the true nature of the lesion to be unsuspected until about a month before the patient's death, when he began to stagger slightly toward the right.

Meningitis. But little progress has been made during the last year in the surgical treatment of meningitis, and it is doubtful whether, except in a few selected cases, it should ever be considered as a surgical condition. Cleveland¹ reports four cases of tuberculous meningitis in children. The clinical picture was one of cerebral irritation with signs of increased intracranial pressure. In the first case the posterior fossa was drained, but the patient only survived the operation seventeen days. In the second case, after tapping one lateral ventricle, the child began to have severe convulsions within an hour and, without regaining consciousness, soon died of exhaustion. In the third case, the lateral ventricle was tapped as in the second case, but the fluid was allowed to escape very slowly. Thirty-six hours later the child had convulsions, and died the third day. In the last case the two procedures were combined, the posterior fossa was drained, and three days later the lateral ventricle tapped. No change, however, in the patient's condition was noted, and the child died the next day. With these not altogether unique experiences, Cleveland concludes that any form of surgical interference in these cases is useless. Lumbar puncture seems to be the one method which affords any relief, though even here the improvement is only temporary. Haltgar² advocates lumbar puncture as a means of relieving excessive pressure in all forms of meningitis. He is inclined to believe that the mechanical effects of the excessive intracranial pressure are more damaging than the infection. The damage produced by the former soon becomes irreparable, while the infection frequently subsides, even after a considerable lapse of time. If this contribution is correct, an early decompression would be clearly indicated, and would avert such disasters as might follow an unrelieved pressure.

In summing up his observations, Haltgar concludes: (1) That the etiology of meningitic symptoms is identical with that of pressure phenomena. (2) The infectious toxic or toxic infectious factor in meningitis has been overrated, and the mechanical element of his clinical picture neglected. (3) The early diagnosis of meningitis depends mainly upon the recognition of actual or suspected intracranial hyperpressure, the removal of which at once becomes the foremost therapeutic indication. (4) Decompression by lumbar puncture is feasible in the majority of cases, as the aqueduct of Sylvius is seldom totally occluded. (5) There

¹ British Journal of Children's Diseases, September, 1910.

² American Journal of the Medical Sciences, March, 1910.

are several reasons for the enormous mortality in tuberculous meningitis: First, the damage to the brain is mostly from pressure, a degenerative encephalitis; second, the coexistence of advanced tuberculosis elsewhere, usually in the lungs; third, the occurrence of miliary meningeal tuberculosis as a terminal infection in such diseases as nephritis, cirrhosis, etc. (6) Tuberculosis of the cerebrospinal meninges owes its danger more to the mechanical effects produced by the excessive pressure upon the medullary centres or on the gray matter, than to its infectious character, for, as is well known, tuberculosis elsewhere has a remarkable tendency to spontaneous cure.

Fractures of the Skull. Ransohoff¹ reviews 190 cases of fracture of the base of the skull. Of this series, the general mortality was 65 per cent., and of these, 37 per cent. died during the first six hours, 56 per cent. within twelve hours. Only 15 per cent. died after the second day, and, of the patients dying in the first twelve hours, Ransohoff does not think any could have been saved by any operation. Some of those cases dying after the first twelve hours he thinks might have been saved if decompression had been resorted to. In 98 cases with deep coma and labored breathing, 70 per cent. died. At autopsy it was found that prolonged unconsciousness was not always caused by hemorrhage. An early rise in temperature was noted in the majority of cases which survived the first day, quite distinct from the reactionary temperature of trauma.

In 19 cases with bleeding from the nose alone, only four recovered, and, although but little importance is usually attached to this symptom, there was a higher mortality in cases with hemorrhage from the nose than in those with hemorrhage from both ears, or from the ears and nose. The mortality was higher in fractures limited to the anterior fossa than in those extending throughout the middle fossa. This may be due to the damage to the under surface of the frontal lobe and the parts contiguous to the Sylvian fissure caused by the impact against the wing of the sphenoid. Of the cases with paralysis, there was a higher mortality. In those with hemiplegia, 16 out of 17 died. Of the whole series only 19 were operated upon, and, of these, 12 died, a mortality of 63 per cent. In 16, the operation was performed within twenty-four hours, usually much sooner; every case of uncomplicated intradural hemorrhage recovered. Only two cases recovered in which there was any subdural injury, though Ransohoff does not attribute any of the deaths to the operation itself. The fatal cases died within twenty-four hours of the operation; the temperature rising rapidly, the breathing growing stertorous, and the pulse rapid.

From his observations, Ransohoff concluded: (1) In basal fractures it is doubtful whether the mortality will ever be reduced, either with

¹ *Annals of Surgery*, June, 1910.

or without operation, as they are principally fatal; 37 per cent. of the fatal cases die within six hours, and 56 per cent. within twelve hours. (2) Of the cases which die within the second day, the coma is not very profound nor the breathing stertorous. In these cases in which the pulse is slow and full, and a lumbar puncture returns blood-stained fluid and showing an increase in tension, trephining is indicated. (3) Where it is not possible to trephine, repeated lumbar punctures may take the place of a decompressive operation. (4) In a large group of cases in which the symptoms are not indicative of any severe injury, 80 per cent. usually recover without operation, and, unless there is some indication of increased pressure, an operation should not be undertaken. (5) In those cases which at first do not appear to be very severe, but which grow progressively or suddenly worse, a decompressive operation is indicated and may be the means of saving many of them. (6) The question as to the best point to trephine in these cases has not yet been determined. The majority of these fractures involve the anterior or middle fossa, and, in these cases, a subtemporal decompression is probably the most satisfactory. When, however, the posterior fossa is involved, a subtentorial opening will afford the greatest amount of relief to the increased pressure.

Bunts,¹ in reviewing 20 cases of fracture of the skull, in which 10 lived and 10 died, found that 8 of these cases had been operated on and only 1 recovered. His conclusions are very similar to those noted above: (1) In simple basal fractures in which there is no severe cerebral laceration, all recovered without the necessity of operation. (2) Practically all cases with bursting fracture and extensive laceration of the brain, died. (3) If symptoms of compression arise soon after the accident, but in which there is no evidence of extensive injury to the brain, they are probably due to hemorrhage, and are generally greatly relieved by a decompressive operation. (4) Late symptoms of compression should always be operated upon at once. (5) At the present time our statistics are not sufficiently full to show whether recovery is hastened by decompressive operations.

Payr² holds that the resulting injury to the brain, in cases of fracture of the skull, is best treated by one of three methods—lumbar puncture, ventricular puncture, or simple decompression. Lumbar puncture, he claims, may prevent irritation of the meninges, the development of adhesions, and relieve the effect of compression. Ventricular puncture may be of service when the brain is injured near the lateral or third ventricle. Fracture and depression attending childbirth should always be regarded as potentially serious injuries, for, apart from the mortality, which Commandeur³ finds to be 14 per cent., the subject may subse-

¹ Ohio State Medical Journal, December, 1909.

² Deut. med. Woch., Band xxxvi, Heft 22.

³ L'Obstétrique, July, 1910.

quently develop a hemiplegia, convulsions, epilepsy, or become idiots or imbeciles. A certain number of depressions spontaneously right themselves in the days or weeks immediately following birth. This is a frequent occurrence in parietal lesions, although rare in frontal depressions. There are four methods of treating these cases: (1) Manual elevation, by which the depression is gradually massaged into its right position. (2) Elevation, by pulling the depression out with a hook, an intracranial method, attended with excellent results. (3) Elevating the depression from beneath by going through one of the sutures. (4) Trephining. Frontal depressions should always be elevated, whether they are the result of accident or not. In parietal depressions, if not the result of accident, several days may be allowed to pass in the hope that the condition may right itself spontaneously. If at the expiration of ten days there is no improvement, operation should be resorted to.

Bircher¹ describes two fractures of the frontal bone, in both of which the injury was produced by a piece of wood driven by a machine against the forehead. The median portion of the frontal bone, with the frontal sinus and the lamina cribrosa, were carried *in toto* into the brain substance.

It is often difficult to determine whether the brain has sustained a serious injury. Absence of symptoms is not always an indication that the brain tissue has not been damaged. As a means of determining the presence or absence of a grave lesion, in the absence of other signs, Tillman² attaches much importance to Head's zones of hyperesthesia. If they persist for years, and if the areas of tenderness correspond in outline to those mapped out at the time of the injury, we have a strong piece of evidence in favor of an intracranial lesion. Of the indications for operation, a good deal of importance is attached to the pulse. The pulse, at first rapid, slows down to 40 or 50, when there is increased intracranial pressure, to become rapid again if the pressure increases or is not relieved. Intracranial pressure and infection are the two principal indications for operation. Convulsions lasting no longer than the first twenty-four hours may be disregarded. Tillman distinguishes between concussion and contusion by noting, in the first, early subsidence of the symptoms, and, in the latter, a tendency for the condition to remain unchanged.

Epilepsy. Of 20 cases operated upon by Carr,³ all cases of idiopathic epilepsy of *long duration*, 6 he reports as cured. The plan of procedure consisted solely in reflecting a large flap, and if anything abnormal was found which might be the cause of the attacks and was amenable to surgical treatment, it was removed. Otherwise the operator contented himself with draining the superabundant serum.

¹ Zentrbl. f. Chir., Band xxxvii, Heft 41.

² Deut. med. Woch., Band xxxvi, No. 13.

³ Surgery, Gynecology, and Obstetrics, February, 1910.

I must confess to a feeling of skepticism as to the therapeutic influence of an exploratory craniotomy and drainage of superabundant serum upon idiopathic epilepsy. Not only am I skeptical as to the therapeutic effect of this procedure, but any other surgical measure for the treatment of idiopathic epilepsy. I am quite sure that a most erroneous impression would be created in the minds of the medical profession if the impression prevailed that 6 out of 20 cases of any series, and of any type, of epilepsy could be cured by any known surgical procedure. While not oversanguine as to the results of operations in cases of traumatic epilepsy, I realize that the scope for surgical intervention in this form is much broader. There is no question as to the relation of trauma to epilepsy, and, with this in mind, an exploratory craniotomy should be performed as a prophylactic measure whenever there is the least suspicion of a depressed fracture, or of an epi- or subdural hemorrhage. Prophylactic measures will be very much more effectual than anything which can be done after the convulsive habit has become established.

Of Tillman's¹ 20 cases of traumatic epilepsy, 60 per cent. were cured and 5 per cent. markedly improved. In a series of 260 cases, tabulated by Tillman, all but 15 per cent. were cured or improved. In all cases of depressed fracture of the skull, or in the presence of any sign suggesting a lesion of the skull or brain, he advocates immediate operation. In a series of cases in which there was a severe injury to the skull and operation was resorted to early, only 1 out of 13 cases subsequently developed epilepsy. Bircher² claims good results from the direct application of massage to the cerebral cortex. After the skull has been opened and the dura reflected, Bircher proceeds to gently massage the underlying cortex with his thumb for from three to five minutes. At the conclusion of the operation, the dura is left open, the bone is replaced, and the wound closed. Four of his patients have been free from attacks for four and one-half, two and one-half, and one-half years respectively. An opportunity to study the effect of cortical massage was offered in one of his patients, who died of some cardiac affection two months after the operation. There were no adhesions in the operative field, a portion of the massaged cortex was somewhat lighter in appearance and slightly depressed. The gray matter had undergone atrophy to such an extent that in some places it was only 3 mm. thick, and in others had entirely disappeared. The result of this treatment, according to Bircher, is practically the same as after extirpation of the cortical centre, with this difference: that after massage the effect is gradual, unattended with paralysis, either motor or sensory, as after cortical excision. Having had no experience with Bircher's method, I hesitate to express any opinion. Can massage of the cortex for a few moments induce atrophy? At first thought such an effect seems almost incredible, and before one

¹ *Archiv f. klin. Chir.*, Band xcii, Heft 2.

² *Zentrbl. f. Chir.*, vol. xxxvii, p. 1.

should be called upon to accept the statement unqualifiedly, evidence, other than observations of a single case, should be furnished.

In all operations upon the brain, but especially in epilepsy, should every effort be made to prevent the formation of adhesions. The prevention of adhesions is a problem still unsolved, either in the peritoneal or cranial cavities. Any contribution toward the solution of this problem is welcomed. Fensterer¹ suggests the interposition of a piece of a hernial sac between the dura and cortex. This method has been tried in animals to advantage, and Fensterer used it in two operations for epilepsy. The results of the operation are reported as satisfactory, although there was no means of determining positively whether the hernial sac had prevented adhesions forming.

Puncture of the Brain. Fortunately, this procedure has never met with the approval of the medical profession in this country. At least I have never seen a report or heard of its being used. It reminds me of the practice of thrusting an exploratory needle blindly into the abdominal cavity for diagnostic purposes in the days before abdominal surgery. It was bad enough in the abdominal cavity, but seems even more to be condemned in the brain. However, for the benefit of those who may want to be enlightened upon the subject we will transmit the views of those who can speak from experience. Pollock² regards it as a valuable diagnostic and therapeutic measure in acquired hydrocephalus, in cysts and effusions in the meninges and brain, in dural hematomas and abscesses. After puncturing the scalp, he bores through the skull with a fine blunt smooth drill, through which a fine hollow needle attached to a Pravaz syringe is introduced. In one case, the patient was thought to have a cerebral abscess. A puncture was made in the right frontal lobe and 18 c.c. of fluid, with some normal brain tissue, were evacuated. This was followed quickly by marked relief of the intense headache. A few days later the left cerebellar hemisphere was punctured and 60 c.c. of fluid evacuated. The second puncture was followed by the patient's complete recovery. Hesse³ cites, as an illustration of the advantages of cerebral puncture, the case of a man who had sustained a serious head injury. Two hours after the accident the patient was unconscious, his pulse 64, his breathing labored, and in a short time the patient appeared moribund. A Neisser-Pollock puncture was made back of Krönlein's point and about 10 c.c. of black blood were removed. The patient reacted promptly, and in a short time the improvement was such that the surgeon felt justified in resorting to a craniotomy at once. A large hematoma was discovered, 35 c.c. of clotted blood were evacuated, and the patient recovered.

¹ *Beit. z. klin. Chir.*, Band lxvi, Heft 2.

² *Deut. med. Woch.*, Band xxxvi, Heft 20.

³ *Archiv f. klin. Chir.*, Band xciii, Heft 1.

THE HEART

Wounds of the Heart. The surgery of the heart is a comparatively new and fascinating field, and its scope grows from year to year. In evidence of the increasing interest in this field may be offered the large number of cases reported in which injuries have been successfully treated; the experimental work designed to perfect the technique of methods already in vogue, and to open new fields of endeavor, and the numerous suggestions purporting to increase the number of lesions amenable to surgical intervention.

In the treatment of heart wounds, Kirchner¹ emphasizes the necessity of carefully considering the patient's immediate condition (as to shock and the effect of hemorrhage), the nature of the operation, the source of infection, and the remote results. Stress should be laid upon the treatment of shock, which, in these injuries, is usually accompanied by some hemorrhage. The nature and extent of the injury should be determined by the exploration of the wound with the finger. In suspected injuries of the heart, it is safer and better to perform an exploratory pericardiotomy than to run the risk of a fatal cardiac hemorrhage. If heart tamponade exists, the condition should be relieved at once, either by the introduction of a finger in the wound until the pericardium is reached or by pericardiotomy. With the exploring finger the border of the heart should be located and definite information as to pneumothorax ascertained. If the wound is mediastinal and the pleural cavity has not been involved, we should be careful to avoid these cavities in opening the chest. The tissues should be carefully pushed from beneath the sternum and ribs with the finger, which serves also as a guide in outlining the flap. If the pleural cavity has been penetrated, less care is required, as a pneumothorax already exists. The nature and position of the wound often determine the location and character of the opening to be made in the chest.

Stimulants and intravenous injections of salt solution should not be given, as a rule, until some means of arresting hemorrhage has been adopted. If drainage is to be used, the external wound should be kept open. Rubber tissue as a drain will permit the discharge of infectious material, and will not plug the opening in the pericardium. It is best to drain the dependent portion of the pleural cavity when infection is likely.

The diaphragm, as well as the heart, was incised in the case operated upon by Renner². When the thorax was opened, the stomach was seen to lie partially within and directly against the heart, the lung was in a

¹ *Annals of Surgery*, July, 1910, p. 96.

² *Deut. med. Woch.*, March 10, 1910, p. 456.

state of collapse. The heart wound, 2 cm. in length, was situated in the left ventricle, and was closed with four silk sutures, which completely arrested the bleeding. The diaphragmatic wound was closed by suturing it to the chest wall (complete abdominal cavities), when it immediately expanded. The operator recommends fixation of the collapsed lung, and believes in drainage of both pleural and pericardial cavities in these cases.

Iselin¹ sutured the wounds of entrance and exit in the left ventricle, and following its course, discovered the bullet tract in the lung and closed it with sutures. The pericardium was drained, and the patient recovered, although convalescence was complicated with a mild attack of pneumonia. Kirchner² operated upon two cases, with one recovery. In the first case, eight sutures were necessary to control hemorrhage, the wound in the left ventricle being three-fourths of an inch long. The patient died four hours later of shock.

The second patient had a wound one and three-fourths inches in length in the left ventricle, which was closed with three deep interrupted sutures and two mattress sutures of catgut. The pericardium was drained.

Rassieur³ records a case of penetrating wound of the right ventricle which was not sutured, but which was healing when the patient died of sepsis. The second patient, who had sustained a bullet wound of the left ventricle one and one-half inches long, recovered. The wound of exit at the base of the pericardium was not closed but used for drainage. The lacerated lung was ligated and about one and one-half square inches removed. The buried portion of the pericardium was excised, and the wound closed with eight silk sutures.

In Tess'⁴ case, the bullet wound penetrated the pericardial sac, the right ventricle of the heart, and the right lung. As the area of cardiac dulness was not affected and the pulse good, exploration was deemed unnecessary. On the second day, however, symptoms of distention of the pericardium developed and the sac was opened. A large quantity of bloody fluid was found and removed; the heart was inspected, but the wounds were not sutured because there was no oozing. The pericardium was drained, the tubes were removed on the seventh day, and the patient recovered.

Ewald⁵ sutured a small stab wound of the left ventricle, closed the corresponding opening of the pericardium, and drained the wound with a gauze wick. The wound healed without infection of the pericardial sac. Ewald admits that this case may have recovered without suture

¹ Zeit. Deut. f. Chir., July, 1910, Band cv, p. 572.

² Loc. cit.

³ Journal of the Missouri State Medical Association, 1909-1910, vol. vi, p. 317.

⁴ California State Journal of Medicine, 1910, vol. viii, No. 2, p. 52.

⁵ Wien. klin. Woch., 1910, Band xxii, No. 52, p. 1817.

of the heart wound, as the wound was of small size and there was little bleeding. As only fifteen minutes elapsed from the time of the injury until the operation was performed, it is impossible to say that compression might not have occurred had operation been postponed. To prevent infection, Ewald believes in complete closure of the pericardium and the introduction of a small gauze wick between the sutures to drain off the fluid which may accumulate.

Wounds of the right auricle are comparatively infrequent. In addition to the following, Luxembourg¹ found but 11 cases. Exploration disclosed an intact pericardium, the bullets, of which there were two, were lying outside. The heart was believed to be uninjured and the wound closed, but the patient died ten hours later and the autopsy disclosed an intact pericardium markedly distended with bloody fluid. The right auricle contained a wound 3 cm. in length.

That the heart is extremely tolerant to injuries, and even to the presence of foreign bodies, is demonstrated by a case² in which a bullet at first lodged against the pulmonary artery, finally penetrated it, and was deposited in the right ventricle. The foreign body remained in this position without causing disturbance, and was found incidentally at the autopsy when the patient died some time after the accident as a result of an injury to the cord.

ANALYTICAL TABLE OF HEART WOUNDS INCLUDING THOSE TABULATED IN PREVIOUS YEARS

	Cases.	Died.	Re- covered.	Mortality. Per cent.	Recovered. Per cent.
Right ventricle	50	32	18	64	36
Left ventricle	67	31	36	46.2	53.8
Right auricle	5	2	3	40	60
Left auricle	3	1	2	33.3	66.7
Left apex	6	3	3	50	50
Coronary artery	1	1	0	100	0
Septum	2	1	1	50	50
Seat not stated	9	5	4	55.5	44.4
					Per cent.
Total number				143	..
Number of deaths				76	53
Number of recoveries				67	40

Thoracic Research. The unfavorable results following intrathoracic operations, both in the clinic and the experimental laboratory, according to Carrel,³ are due to a lack of adaptation of the technique to the physiological conditions of the chest. The cause of death, in most instances, is either infection of the pleural or pericardial cavities, or respiratory disorders resulting from the entrance of air into the thorax. Of these two, the

¹ Deut. Zeit. f. Chir., 1910, Band civ, p. 155.

² Viscontini, *Gaz. degli Ospedali e della Cliniche*, June 2, 1910, No. 66.

³ *Annals of Surgery*, July, 1910, p. 83.

most important is the avoidance of infection. Too much stress has been laid upon this or that type of apparatus to prevent pneumothorax.

Believing that certain diseases of the heart and aorta are amenable to surgical treatment, Carrel instituted a series of experiments, not only for the purpose of devising means to meet specific indications, but also to improve the technique of intrathoracic operations generally.

As the diagnosis of aortic aneurysm can be made at a comparatively early period, it is altogether unreasonable to plan for its extirpation; but before doing so, some way must be found to repair the arterial wall. In the sacciform aneurysm with a narrow pedicle, Carrel uses a long incision, but, in most cases, a part of the wall or a complete segment of the artery must be resected. He has already succeeded in repairing the arterial wall with patches from artery, vein, or peritoneum, and in substituting for a part of the abdominal aorta a piece of rubber sheeting without interfering with the circulation. The blood must be diverted during the operation, because the aortic circulation cannot be interrupted for a long time without the occurrence of severe nervous complications. For this purpose, he has used (1) temporary intubation of the aorta, or (2) an artificial collateral circulation. In the first method (central diversion) a paraffined tube is introduced into the lumen of the aorta to be resected. The wall is then extirpated and replaced with suitable material. The tube can remain *in situ* several days without danger of coagulation of blood in the tube. The method is safe and convenient for the descending, and might be used for the ascending aorta. (3) An artificial collateral circulation (lateral diversion) is established by making a communication between the left ventricle and the descending aorta, or between two parts of the aorta.

In Carrel's research, the following experiments were included: The ascending aorta of a dog was incised and sutured, and showed, two and a half months later, a perfectly healed wound. The transverse suture of the descending aorta was practised six times after complete or incomplete section. One dog died from secondary hemorrhage, and, in the five which recovered, the vessel was neither dilated nor stenosed at the site of anastomosis. There were a number of experiments in which, after directing the blood stream, the aorta was removed and replaced by a piece of vein.

A forecast of what in the future may be possible in the management of cardiac lesions in the human may be gleaned from the list of operations which Carrel has found feasible in animals. They are divided into three classes: (1) Those which can be performed without the help of temporary hemostasis, such as digital exploration of the ventricles or the auricles, dilatation of the mitral valve, dissection and preparation of a coronary vessel for anastomosis, incomplete ventriclectomy, and suture. (2) In the operations which require hemostasis for a short time, the cavities of the heart are open for about a minute, during

which time it becomes possible to insert and fix a tube or vessel into the ventricular or auricular cavities, to open and to suture the ventricular wall. It would be feasible also to cut a mitral or tricuspidian valve, or to curette an endocardial vegetation. In mitral stenosis it would be easy to incise the valve. (3) Operations requiring interruption of the circulation for a longer time consist of more complicated plastic operations on the cardiac wall, and of operations on the coronary arteries. These aim to establish a complementary circulation in cases of angina pectoris in which the mouth of the coronary arteries is calcified. The danger of these operations lies in the length of time the heart's action is stopped. The technique must, therefore, be developed in such a manner that no cardiac operation should last more than five minutes. It seems possible, although hazardous, to arrest the circulation and the respiration for that length of time with the hope afterward of restoring the animal to a condition of normal life.

Cardiolysis. Since last reviewing the subject of cardiolysis we find it used in numerous instances, on the whole with gratifying results. Though originally devised for the relief of adhesive mediastino-pericarditis, it has been used in other conditions. Thus, Morrison¹ refers to a case in which cardiolysis was practised for the relief of excessive hypertrophy in aortic valvular disease associated with severe and frequent attacks of cardiac pain.² Since his discharge, in 1908, the patient has only had occasional attacks of pain. From the result in this case it is assumed that the attacks are in large measure due to muscular erethism induced by the central stimulation of the hypertrophied and powerfully pulsating organ. The removal of the costal barrier affords freer and more expansive cardiac pulsation, in consequence of which the erethetic crises are less frequently provoked.

When the heart undergoes compensatory hypertrophy for a valvular insufficiency it performs a certain amount of extra work. This extra work Beverly³ designates as "internal" in contrast to "external" work required to raise the ribs and sternum with each systole. As the valvular leak cannot be repaired, and the "internal" extra work cannot be reduced, the "external" extra work can be lightened by removing the structures (ribs) which offer resistance to the already embarrassed heart and afford a larger space and less impediment to its action. Upon this fantastic theory, Beverly recommends cardiolysis as a palliative procedure in valvular lesions.

It has already been shown conclusively that cardiolysis can be performed with reasonable safety, and that, in suitable cases, it may prove of great value. So far as the question of safety is concerned there is no recorded instance of death or any untoward result, although certain risks,

¹ Lancet, November 20, 1909, p. 1494.

² PROGRESSIVE MEDICINE, March, 1909.

³ British Medical Journal, April 16, 1910, p. 914.

especially that of the anesthetic, must be reckoned with. Of the 18 cases collected by Thorburn, the results were satisfactory in 12, 8 of which were able to resume their occupation; 6 were improved sufficiently to justify the operation, and 4 were unimproved. A later analysis¹ places the number of cases operated upon at 30, 21 of which were improved. The most promising cases are those in which the symptoms are due directly to adhesion of the pericardium to the thorax, and especially, according to Mouriquand,² in tuberculous pericarditis between the ages of fifteen and thirty.

Thorburn prefers a curved incision, turns the flap outward. In most cases the ribs and cartilages are excised, but the sternum is left intact. While some surgeons lay stress upon the importance of removing all the periosteum and perichondrium to prevent bone regeneration, others claim that the posterior periosteum cannot be removed without injuring the pleura. Even if regeneration should occur, it would seem probable that the heart would readily provide space for its action in the thin layers of bone which would be formed, and that, as the cartilages would in no case regenerate, there would always be an ample gap in the chest wall, while the ends of the ribs, having no attachments, would accommodate themselves to the requirements of the heart.

THE LUNGS

Wounds of the Lungs. In the March, 1910, number of *PROGRESSIVE MEDICINE*, I called attention to the fact that the very radical measures employed by some surgeons in the treatment of stab or bullet wounds of the lung did not seem justifiable, and that reasonable conservatism in the management of these cases would be followed by a lower mortality than if exploration were resorted to too frequently. This statement was made in discussing Stuckey's paper, in which he advised immediate operative interference in all cases seen within the first twelve hours. That most excellent results are obtained by properly selecting the cases for operation, and treating others conservatively, is concluded by Moller³ in his report of 90 cases of lung injury. From the analysis of these cases it would appear that a higher mortality attends the radical than the conservative treatment. The high mortality in Stuckey's cases was due rather to the consequent infection.

Of the 90 wounds of the pleura or lung, in Moller's series, 48 were gunshot wounds, 19 stab or incised wounds, and 23 had a subcutaneous laceration of the lung; 12 with and 11 without fracture of the ribs or sternum. In the 48 gunshot wounds, hemothorax was present 37 times, hemothysis 21 times, pneumothorax 12 times, emphysema 9 times,

¹ Roux-Berger, *Semaine médicale*, September 7, 1910.

² *Lyon Chirurgical*, December 11, 1909.

³ *Archiv f. klin. Chir.*, 1909, Band xci, S. 295.

and empyema 9 times. Puncture and aspiration were resorted to 10 times, ribs were resected twice, and the bullet extracted in fourteen. The cases were complicated in five instances by pericardial wounds, in 2 by heart wounds, in 2 by diaphragmatic and abdominal wounds, and an injury to the spine in 1. Of the 19 stab wound cases, there was a hemothorax in 3, a pneumothorax in 7, and emphysema in 8. Puncture and aspiration were employed in 2, and the average period of convalescence was three and one-half to four weeks. Of the 23 cases with subcutaneous rupture of the lung without wound of the thoracic wall, hemothorax was noted in 3, hemoptysis in 4, pneumothorax in 1, and emphysema in 8. Seven patients died, and, of the survivors, the average convalescence was four weeks. In a total of 67 cases of penetrating wounds of the thorax, there were only 7 fatalities, and in only two or three of these was the question of operation considered.

Among the indications for operation Moller includes severe primary hemorrhage, continuing secondary hemorrhage, and severe pneumothorax and emphysema of the cellular tissues, and secondary pneumothorax.

The following statistics show the advantage of conservatism in the treatment of these injuries:

	Cases.	Mortality.	Empyema.	Time of healing.
Stuckey	25	9 (36%)	12 (48%)	10 weeks.
Moller	19	0	0	3½ to 4 weeks.

Hernia of the Lungs. Of the two varieties of this affection, the congenital and the acquired, the former becomes apparent shortly after birth and is due to defects in the sternum, costal cartilages, or ribs; the acquired variety to trauma or to pathological processes.¹ The traumatic cases recur either at the time of the injury, when the ribs, sternum, or muscles are torn and ruptured, or during the healing of a wound, when the scar tissue gradually yields to the pressure within the thorax. Among the pathological processes preceding hernia are included abscesses, caries of the ribs, pressure atrophy of the ribs, perforating abscess, and empyema. The spontaneous type of hernia may arise from increased volume of the lung, increased intrathoracic pressure, and from lowering of tissue resistance. These conditions most commonly are encountered in cases of emphysema and in patients with persistent cough.

In some cases the hernia is reduced spontaneously, in some there is an appreciable increase in size, and, in others, adhesions prevent either its reduction or expansion. While radical measures have been resorted to, for the majority a dressing designed to protect the hernia from injury will suffice. The patients should be instructed to avoid heavy work, and coughing should be checked by appropriate remedies.

¹ *Deut. Zeit. f. Chir.*, 1909, Band cii, p. 89.

Empyema. The conditions to be dealt with in chronic empyema are thus summarized by Dowd.¹ The shrunken lung is against the mediastinum in the upper part of the chest; there is a lateral curvature of the spine with concavity toward the affected side; the ribs are crowded, the intercostal spaces obliterated, and a deposit of bone is found on their inner surface; the diaphragm is adherent to the chest wall as high as the sixth rib; there is a firm exudate on the pleura, and a thick-walled sinus forms, leading from the opening in the chest wall to the apex of the pleural cavity. Dowd advocates a modification of the more radical Schede operation; he resects three or four inches of the rib above and below the sinus, carries his incision upward, usually in the anterior axillary line, to the third rib, and removes one-half inch from the second or third, four to six inches from the tenth, and corresponding pieces from the intermediate ones. A longitudinal incision is then made in the sinus until the lung is exposed. The patient is now allowed to recover partially from the anesthetic, and when, in coughing, the lung bulges into the incision, a strip of the pleura two to three inches long and one to two and one-half inches wide is separated and removed. With the aid of heavy sutures the gap in the chest wall is closed, and a tube introduced for drainage.

The results were encouraging; twelve out of fifteen patients were in excellent health from a few months to nine years after the operation, with varying degrees of chest expansion and chest capacity, and without lateral curvature of the spine. The lung capacity on the affected side remains much diminished. The mortality was between 5 and 10 per cent.

Cardiac Massage. The best results from cardiac massage have been obtained by the subdiaphragmatic method (see table), and the most frequent indication for its use, thus far, has been the respiratory and circulatory failure in chloroform narcosis, although the method is applicable to heart failure secondary to respiratory failure of other forms and not dependent upon organic changes. The possibility of resuscitation bears a definite relation to the time that has elapsed between the cessation of the heart beat and the institution of massage. White,² from a series of experiments, concluded that respiration ceases before the cessation of the heart action. Artificial respiration alone is rarely successful, but, when both heart and respiration have failed, it is possible to resuscitate by resorting to both massage and artificial respiration. Fibrillary contractions of the heart and voluntary muscles were noted in many of the fatal cases, and, of those in which the heart was examined post mortem, the only macroscopic changes were the dilatation of the ventricles with venous blood in a fluid state.

¹ Journal of the American Medical Association, 1909, vol. liii, p. 1281.

² Surgery, Gynecology, and Obstetrics, 1909, vol. ix, No. 4, p. 388.

A summary of the cases treated by massage is shown in the following table:

Method.	Successful.	Partially successful.	Failures.	Total.
Direct	2	8	18	28
Transdiaphragmatic	1	2	3
Subdiaphragmatic	8	5	6	19
Total	10	14	26	50

In a case of chloroform syncope, Rehn¹ tried artificial respiration first by the Sylvester method and subdiaphragmatic massage. Failing in resuscitation, he opened the diaphragm, practised direct massage, and, at the same time, established positive differential pressure with the Brauer apparatus. The action of the latter upon the respiratory movements and heart action was immediate. Both were completely restored in two and one-quarter hours. The condition of the patient remained most satisfactory for two hours, when respiratory collapse again occurred and death followed after an ineffectual attempt at resuscitation. The secondary collapse was due, Rehn believes, to the pneumothorax which occurred when the pleura was torn in opening the diaphragm for diaphragmatic massage. In order to avoid injuring the pleura, greater care should be exercised in selecting the spot at which the diaphragm is to be opened.

Intratracheal Insufflation. In the course of their experiments, Meltzer and Auer² discovered that the ventilation of the alveolar air can be accomplished by a continuous movement in one direction. When, through a tube in the trachea, the caliber of which is distinctly smaller than the lumen of the trachea, a stream of plain air is sent continuously through the tube, the life of even a completely curarized animal can be maintained. The deeper the tube reaches, the longer does the animal live, but satisfactory results are obtained only when the tube reaches the bifurcation of the bronchus. In non-curarized animals, the continuous insufflation of air under a moderate pressure reduces voluntary respirations of the animal to six or eight per minute. With an increase of pressure to 20 or 25 millimeters of mercury, a complete apnea may be obtained. Whether the animal is in a state of apnea from pressure or is freed from voluntary respirations by any of the methods which eliminate the respiratory centre, as when the thorax is widely opened, the lungs are found to be more or less distended, of pink color, and completely quiet, while the heart is beating efficiently and regularly. The success and safety of artificial ventilation was assured upon discovering that when the tube did not seem to be so well adjusted, and the color of the lungs as well as the action of the heart indicated that asphyxia was imminent, interruption of the air stream averted the danger.

¹ Münch. med. Woch., November 30, p. 2462.

² Medical Record, March 19, 1910, p. 477.

That the prolonged presence of the tube within the trachea and the insufflation of air is harmless to the respiratory system has been shown at the autopsies of animals which died with no evidence of any deleterious effects. Further investigation showed that foreign substances from the pharynx would not enter the trachea against the air current.

Another important and practical feature is the remarkable ease with which the animals may be anesthetized by this method; not a single animal was lost by intratracheal ether anesthesia, and when dogs were killed by ether administered in the usual way, it was possible to resuscitate them by insufflation even fifteen minutes after the cessation of the heart beat. Meltzer goes so far as to say that this is the safest and most effective way of administering ether. Bringing the ether under increased pressure to the terminals of the respiratory surface hastens the effect, and the continuous returning current of air prevents undue accumulation in the bronchi and alveoli.

The method of intratracheal insufflation is thus briefly described. After the dog is anesthetized, a long catheter or a piece of stomach tube is introduced through the larynx and pushed down the trachea until it meets an obstacle; it is then withdrawn about an inch and a half, bringing the end about the level of the bifurcation. The diameter should be definitely smaller than the lumen of the larynx, and should appear rather too small than too large. The outer end of the tube is now connected with a T-tube, one branch of which goes to a manometer, while the other end, connected by means of heavy rubber tubing, is arranged so as to permit the current of air to pass either through the bottle or directly between the bellows and the animal. The tube between the bottle and bellows should be provided with a T-tube or plain opening which is opened for a few seconds a few times in a minute.

The value of the intratracheal method of Meltzer and Auer seems still open to debate. Meyer,¹ for example, an advocate of the universal differential pressure chamber, sees many objections to the Meltzer and Auer method. Intrathoracic surgery cannot be done properly and safely without differential pressure apparatus. *Negative* and *positive differential pressure* are, it seems, not identical in their effects upon sick human beings. Whether they are or not must still be established, and indications found for their use. This is rendered feasible by the *universal differential pressure chamber*. Continuous intratracheal insufflation, as practised by Meltzer and Auer, appears to be a positive differential pressure system. Its weak points are the use of the human trachea as a vital part of the apparatus; the possibility of aspiration at the beginning of the operation, with subsequent pneumonia, and of interstitial emphysema at the end of the operation as a consequence of its employment; also the required deep anesthesia. Intubation reaching

¹ Medical Record, March 19, 1910, p. 483.

below the glottis has been found to give rise, in the human trachea, to immediate copious secretions of mucus. Sudden complete interruption of the prevailing differential pressure, followed immediately by its equally sudden restoration, is liable to damage the human heart. Very slight changes in intratracheal pressure give rise to very great changes in blood pressure. Continuous intratracheal insufflation apparatus is not adopted for use in the after-treatment, nor is it otherwise all-sufficient. Those employing it need some other type of differential pressure in order to be prepared for every emergency. The safest method of general anesthesia is the one used in our every-day surgical work, the inhaling of the narcotic with spontaneous respiration and with mouth and throat left unencumbered. This method is used in the large differential chambers. In surgery, when entrusting human life to the safe working of a mechanical apparatus, it is wise to have some substitute on hand in case of accidents. In continuous intratracheal insufflation everything depends, at present, upon the one cannula and the patency of the trachea. As far as the patient is concerned, a differential pressure system, leaving mouth, throat, and trachea unencumbered, appears preferable to one requiring intubation.

A thoroughly practicable apparatus for the employment of artificial respiration during operations in the thorax must satisfy the following conditions, according to Dorrance:¹ It must be simple enough to be used readily by surgeons of average skill and experience; it must be simple in construction so that there may be no danger of its failing to work at a critical moment during the operation; it must be cheap and durable, must not easily get out of order, and must be portable; the apparatus must be capable of being operated by hand power in case the electric or other form of motor breaks down at a critical moment; there must be no trauma of the laryngeal tissues. In the author's opinion, the Matas clinical respiratory apparatus, with the intratracheal pressure bulb which he has devised, nearly complies with the above specifications. The tube is made of soft rubber of different sizes; near its tip it is surrounded by an inflatable bulb or cuff which holds the tube firmly within the trachea and prevents regurgitation of air along the outside of tube.

A special advantage of the tube is that it passes through the larynx and enters the trachea, so that reflex stimuli are not excited to the same degree as when an intralaryngeal tube is introduced. For this reason the tube can be used when a patient is not completely anesthetized, as in the apparently drowned, in cases of opium or carbolic acid poisoning, or in other forms of poisoning with failure of respiration, and in asphyxia neonatorum.

Flint² believes that the future of thoracic surgery depends upon the successful application of the positive differential or the Meltzer and Auer

¹ *Surgery, Gynecology, and Obstetrics*, August, 1910, p. 166.

² *Yale Medical Journal*, February, 1910.

method. The failures in the application of the positive pressure method have been due largely to the faulty types of apparatus rather than the method itself. On this account, Flint constructed a new apparatus embodying the factors which he considers most essential, namely, absolute control of the anesthetic, metal construction to avoid the possibility of a breakdown, and simplicity of construction and operation. (For a full description of Flint's apparatus, see original article.) In his experiments he has been quite successful, and from them he has drawn some very positive conclusions. For example, he believes that the positive pressure method of maintaining the normal pressure difference is the practical, as well as the physiological, equivalent of the negative pressure in thoracic surgery. Total pneumectomies in dogs may be done as successfully by the positive pressure as by the negative pressure method, provided that the intercostal incision is closed in such a way as to prevent a pressure pneumothorax. This can be accomplished by the use of an equalizing tube which is withdrawn in respiration after raising the intrapulmonic pressure. By the use of an aspiration apparatus with a water valve regulator, any desired degree of negative pressure can be restored to the thorax after an operation is carried out by the plus differential method, as in the Meltzer and Auer procedure. This converts, in effect, any positive pressure into a negative pressure apparatus. More than half the lung tissue in dogs may be removed. Bilateral lobectomies can be done in two sittings. Opening the pleura does not have any constant influence on the respiratory or cardiac rhythm. Ligation of the root or removal of the lobes tends either to reduce the rate of both pulse and respiration, or else to show no effect whatever in the majority of instances. With closure of the pleura there is an increase in the rate of both pulse and respiration in the majority of cases.

Elsberg,¹ who has used intratracheal insufflation in several cases, makes the following suggestions: The tube should be rubber and fairly rigid, it should be as long as a stomach tube, contain an opening at its lower end, and should fill about one-half of the lumen of the trachea with the patient fully anesthetized after cocainizing the larynx and pharynx. The sterilized tube should be introduced in the manner described in Meltzer and Auer's original article. This treatment was used to advantage in a case of myasthenia gravis, and showed the value also in the treatment of asphyxia, such as that of chloroform, or opium poisoning, or asphyxia neonatorum.

The first intrathoracic operation with the Meltzer and Auer method was performed by Lilienthal.² The operation was successful from the standpoint of insufflation, but the lung abscess could not be found, probably because a large quantity of pus had been coughed up just before the

¹ *Annals of Surgery*, July, 1910, p. 23.

² *Ibid.*, p. 30.

operation. The patient took the anesthetic well, only a small quantity of ether was required, and the contrast between the effects of the anesthetic when given in the ordinary manner and by insufflation was striking. As soon as insufflation was begun, the patient, who had been struggling and coughing with his pharynx filled with mucus, became quiet, and the rattling of mucus in the trachea and pharynx disappeared. The patient recovered consciousness unusually quickly.

Differential Pressure in Empyema. Differential pressure has been employed in the treatment of empyema for a comparatively short period, but those who have used the method regard it as distinctly influential in shortening the period of convalescence. Meyer¹ has been unable to obtain as favorable results as reported by Sauerbruch.² It is rarely possible, he believes, to prevent, with certainty at least, a partial pneumothorax, because it is difficult to distend the inflamed and infiltrated lung tissue, and some space will nearly always remain between its surface and the thoracic wall, even under high differential pressure. He has been impressed, however, with both the simplicity of the treatment and with the benefits of breathing under differential pressure during the after-treatment.

With the use of differential pressure and air-tight dressings, the mediastinal deflection is averted and the cavity diminished during respiration. The air within the cavity is under negative pressure, the mediastinum and pericardium are further deflected toward the cavity, and expansion of the collapsed lung encouraged. Apart from shortening the period of convalescence, the freedom from the disagreeable odor and the discomfort of prolonged dressings, the earlier restoration of the collapsed lung to its normal expansion may lessen the danger of subsequent tuberculosis.

Tennant³ does not remove the drainage tubes, or make any effort to secure lung expansion for the first five days. If there is no direct communication with the bronchus, the application of the hyperemic cup completely covering the opening for a half hour or more, combined with forced expiration, rapidly expands the damaged lung and drains the cavity. When necessary, the suction cup may be strapped over the opening and a constant negative thoracic pressure maintained. The wounds close with surprising rapidity under this treatment, in the writer's experience on an average of twelve days.

Chondrotomy. Section of the upper costal cartilages has been recommended to meet two indications: To relieve the rigidity of the dilated thorax in cases of emphysema, and to widen the apex of the thorax in the narrow and contracted chests of incipient cases of pulmonary tuber-

¹ *Annals of Surgery*, July, 1910, p. 35.

² *PROGRESSIVE MEDICINE*, March, 1909.

³ *Annals of Surgery*, 1910, vol. li, p. 84.

culosis. According to Mohr,¹ chondrotomy is indicated only when the emphysema is the result of rigidity of the costal cartilages. In the cases of respiratory difficulty following bronchitis, cardiac or nervous disorders, the operation is worthless.

The rigidity of the thorax, which may be the cause or the result of emphysema, may be recognized by the general appearance of the patient, or by the radiograph which will disclose some alteration in the outline of the cartilage and rib, the disposition of lime salts, and the absorption of cartilage. By inserting a needle into the suspected cartilage, in the absence of its normal elasticity, the needle will meet with increased resistance, or enter cavities due to degeneration of the cartilage. In certain cases, a coexistent bronchitis or catarrh, and the circulatory disturbances secondary to emphysema, may be favorably influenced by the operation.

The technique which Velden² used in ten cases consisted in a unilateral resection of the second, third, and fourth cartilages with their posterior perichondrium. The resulting pseudo-arthritis affords a greater range of expansion. The capacity of the lungs is increased as much as 100 per cent., and the chronic bronchitis rapidly subsides. In many instances the area of cardiac dulness has appreciably diminished, and the cyanosis disappeared. The benefit will not be permanent unless the patient is taught to use the costal type of breathing and to engage in other respiratory exercises.

There is no operation, either upon the ribs or their cartilages in apical tuberculosis, which is acceptable either to surgeons or physicians as a class. Here and there we find a surgeon with the courage of his convictions who continues to recommend surgical procedure in cases of incipient tuberculosis, sometimes even in cavity formation. But the results have not been such as to commend the operation to the profession; and it is unlikely that surgery will ever play any serious part in the treatment of pulmonary tuberculosis.

Even for those who may advocate chondrotomy, it is difficult to select suitable cases. The physical signs offer no clue; if the radiograph shows changes in the cartilage and narrowness of the apex, the operation may be of value. Even in the presence of these structural changes if the lung is involved below the level of the second or third rib, the operation is contraindicated. Hansemann³ would restrict its use to cases of apical tuberculosis associated with constriction of the upper portion of the thorax.

Lung Resection under Both Forms of Differential Pressure. Up to the present time the surgery of the lungs is mostly in the experimental stage, little by little and step by step the problems and difficulties are

¹ *Archiv f. klin. Chir.*, 1910, Band cxii, S. 999.

² *Ibid.*, Band xcii, S. 981.

³ *Ibid.*, S. 988.

being met, so that the time is not far distant when it will be possible to invade the thorax with reasonable safety.

The perfection of the differential pressure apparatus and the prevention of sepsis during operations are the two most important contributing factors to the present day. In spite of the brilliant achievements in the laboratory, many animals die a few days after excision of the lung, death being attributed to the collection of fluid in the pleural cavity. The success of this operation depends upon the early obliteration of the remaining cavity and the prevention of the accumulation of an exudate. To overcome these difficulties, Sauerbruch and Robinson¹ tried three different methods:

1. In the first series, the operation was performed through an intercostal incision under positive pressure, but the mortality was higher than when negative pressure was used. Positive pressure favors the formation of a pleural exudate, while negative pressure tends toward obliteration of the remaining cavity. What has been observed after the removal of an entire lung is seen only in a less degree when a single lobe or smaller sections are removed. There can be no doubt that the space which remains after the extirpation of a single lobe diminishes more readily under negative pressure.

2. In the second series of experiments, a thoracoplasty was performed to diminish the size of the cavity after removal of the lung. No marked diminution followed when only two ribs were removed, and the accumulation of fluid in the pleural cavity was not prevented. To diminish the cavity sufficiently to prevent the collection of a transudate, and to remove the danger of mediastinal displacement by the external atmospheric pressure, at least four ribs should be resected, the number depending somewhat upon the condition of the mediastinum. In the presence of a thin movable mediastinum, total removal of the lung is very dangerous; but if the mediastinal pleura is thick, strong, and unyielding, the dangers associated with its displacement need not be feared.

3. The third series of experiments dealt with the treatment of the bronchus. If the bronchus is diseased, or if, in the presence of infection, it is dangerous to open the pleural cavity, suture or ligation of the stump is inadvisable. The bronchus or the whole lung root should be stitched to the chest wall, and the lung removed primarily or secondarily. The experiments showed also that the forcible and sudden displacement of the entire mediastinum, with the heart and its vessels, may prove to be a serious if not a fatal complication. While the lung may tolerate displacement better than the other structures, although congestion and excessive exudation may lead to loss of nutrition and gangrene, it is advisable to conclude the operation with a thoracoplasty in order to

¹ *Annals of Surgery*, March, 1910, p. 310.

lessen the distance between the lung root and the chest wall, and thus avoid traction of the mediastinum.

Von Eberts¹ found that while complete obliteration of an eviscerated pleural cavity may be obtained by closure under exaggerated pressure, such a procedure not only imposes a serious strain upon the bronchial stump and the mediastinum, but may cause critical symptoms, both respiratory and circulatory, owing to the disturbance of the normal respiratory rhythm and the sudden displacement of the heart. Further experimentation may prove that within certain points hyperpressure may be safely used, but it would appear that uniform results can be obtained only when, in closing an eviscerated cavity, a pressure difference is left behind which closely approximates the physiological. This negative differential should necessarily be without violent effect upon either the mediastinum, heart, or great vessels. A closed pneumothorax invariably proves fatal. In the presence of such, the mediastinum oscillates with each inspiration toward the sound side, and, in the absence of lung tissue, there is practically no absorption of the enclosed air, and transudates inevitably accumulate.

Therapeutic Pneumothorax. An artificially induced pneumothorax, in cases of unilateral tuberculosis, is beneficial, in that it puts the diseased lung at rest. The cavities collapse, their secretion is expressed, and the aspiration of tuberculous material from diseased to sound areas becomes impossible. According to Muralt,² there is no fixed rule by which we can determine the length of time that the treatment should be persisted in, although the early cases require less than those in which there has been cavity formation. In most instances, from six months to one year will be sufficient, and, while this may seem a long time, it should be remembered that the patients are not prevented from pursuing their customary occupation.

Muralt treated 13 cases in this way, and Saugman and Hansen³ 54 without any complication. In addition to the injection of nitrogen, the same attention should be paid to the usual hygienic measures. Spengler⁴ secured 25 favorable results out of 41 cases treated; 12 cases showed some improvement, while the effect was harmful in 3. The presence of pleural adhesions has always been a contraindication for the production of pneumothorax, because of the danger of embolism when the gas is introduced under any degree of pressure. Many cases, therefore, must be treated by other methods, unless, following the suggestion of Holmgren,⁵ the pleural adhesions are detached by injecting salt solution with a moderate degree of force before introducing the gas.

¹ Montreal Medical Journal, June, 1910, p. 373.

² Münch. med. Woch., 1910, No. 51, p. 2641.

³ Beiträge zur Klinik der Tuberkulose, 1910, Band xv, No. 2.

⁴ Correspondenz-blatt f. Schweizer Aerzte, 1909, Band xxxix, S. 801.

⁵ Münch. med. Woch., 1910, No. 36, p. 1884.

As an indication of the good which artificial pneumothorax has on tuberculous processes, Gradi¹ refers to the results obtained in cases of laryngeal infection. It is a well-known fact that tuberculosis situated in this region, especially when secondary to a pulmonary focus, is generally hopeless, and that treatment is almost futile. This is attributed to the constant irritation of coughing and the reinfection of the larynx by the sputum. When, by artificial pneumothorax, the source of irritation is removed, there may be some hope of cure.

Mediastinal Tumors. Many of the benign and malignant growths of the mediastinum, formerly regarded as inoperable, may be made accessible by the more recently developed technique of intrathoracic procedure. Sarcomatous growths are found more frequently than carcinoma, in many instances preceded by trauma. Chronic irritation and syphilis are also mentioned by Bosanquet² as predisposing causes. The principal symptoms are the direct result of pressure upon the veins, arteries, nerves, trachea, bronchi, esophagus, thoracic duct, lungs, and heart; the commonest complaint being dyspnea, although irritation of the bronchial nerves may give rise to a spasmodic form of dyspnea. Some writers endeavor to draw a distinction between the symptoms of tumors in the anterior and those in the posterior mediastinum. This distinction is not of much value, because the commonest growth, the lymphosarcoma, quickly spreads throughout the cavity of the thorax and invades the glands of the mediastinum. Out of 30 cases, Abram³ found 17 sarcomata and 8 carcinomata of the mediastinum. While, in most instances, the treatment can only be palliative, some good results have been obtained from the frequent use of the x-rays. Whether a cyst, not causing symptoms, should be removed is an open question, as some may persist throughout life without causing any trouble. Bosanquet thinks they should be left undisturbed. Under certain conditions, however, dermoid cysts may demand operation, as in the case of suppuration. As to the solid tumors, Friedrich⁴ refers to several cases in which they were successfully removed. The best exposure can be obtained by operation through a transverse incision extending from 10 to 12 cm. on either side in the second intercostal space; the intercostal muscles are carefully divided so that the pleura is not injured. The sternum is then divided, the cartilages of the second and third ribs cut through, and the sternum elevated carefully while the underlying structures are detached. If necessary, additional space may be obtained by dividing the cartilages still lower down and cutting the intercostal muscles at a point beyond the extremities of the original incision.

¹ Deut. med. Woch., June 2, 1910, p. 1023.

² Clinical Journal, December 6, 1909, p. 132.

³ Clinical Journal, April 6, 1910, p. 401.

⁴ Zentralblatt f. Chirurgie, September 17, 1910, p. 1249.

Air Embolism. This much mooted question is again the object of experimentation. There is probably no subject about which there has been so much contradictory evidence, at least in the research laboratory. Blair and McGuigan,¹ in their experiments, found that the respiration failed first and that, if artificial respiration was resorted to immediately, the heart in some cases would resume its normal function. But while respiration is the first to fail and the heart continues to beat, the respiratory failure is in reality due to the cardiac embarrassment, for there is so little blood in circulation that the respiratory centres suffer from lack of nutrition. It is a well-known fact that many cases of air embolism, if let alone, and untreated, recover. Treatment, to be effective, must, in most cases, be quickly applied. Blair and McGuigan recommend the introduction of adrenalin chloride in a fairly concentrated solution of from 1 to 10,000 to 1 to 1000, together with a small amount of saline solution directly into the right ventricle.

In the human subject, a fine hypodermic needle should be thrust directly into the right heart, through the third or fourth right intercostal space. The violent contraction of the muscle that follows the introduction of a concentrated adrenalin chloride solution constitutes a powerful agency in overcoming the embarrassment caused by pressure over the distended heart. When respiration ceases, artificial respiration should be employed and, as a last resort, cardiac massage applied. The patient should be kept recumbent, as the erect posture seems to aggravate the condition. In animal experiments, when air was forced in under pressure, it was necessary to treat the emergency within two minutes, but it is probable that, in many clinical cases where but small quantities of air were aspirated, the condition is not so rapidly fatal. Clairmont² proposes to effect the same result by aspiration of the air from the right heart.

THE ESOPHAGUS

Cancer of the Esophagus. The surgery of the thoracic esophagus is more or less in the experimental stage, for the technical difficulties to be overcome are many. With the danger of pneumothorax removed by the use of differential pressure, it became necessary to devise methods of securing accurate approximation of the divided esophagus, for leakage from the wound was almost inevitably followed by fatal infections of the pleural cavities. End-to-end anastomosis of the esophagus by the use of the button has been tried, and, while this seemed at first to be the best method, Green and Janeway³ found it safer, in using the button, to make a lateral rather than an end-to-end anastomosis. For

¹ *Annals of Surgery*, October, 1910, p. 471.

² *Archiv f. klin. Chir.*, 1910, Band xcii, Heft 4.

³ *Annals of Surgery*, July, 1910, p. 58.

practical purposes they look upon cancer of the aboral end of the esophagus and the cardiac portion of the stomach as one lesion, and recommend the gastroscope as a means of making an early diagnosis. Any operation for the removal of cancer in this location must include not only a portion of the esophagus, but also a considerable part of the stomach, especially along the lesser curvature. This can be accomplished without undue tension by an end-to-end anastomosis with sutures. By this method, Janeway and Green secured 10 recoveries out of 17 operations on dogs, and 5 out of the last 6. The subsequent death of the animals which recovered from the immediate effects of the operation was due to interference with the function of the pylorus, and may be avoided by a pyloroplasty.

That this operation is still in a most primitive stage may be gathered from the uniformly fatal results that have attended every attempt to remove carcinoma of the esophagus. According to Meyer,¹ there have been, all told, 34 operations, in 21 of which the esophagus was resected. There was 1 case of esophagogastrostomy with the button, leaving the tumor in place, and 6 cases of exploratory thorectomy in which the local conditions were such that resection was not attempted.

In Meyer's experience, the fatalities may be due to general anesthesia, to hemorrhage, to imperfect asepsis, or to shock. While it should be possible to eliminate the first three factors, the prevention of shock is a more difficult problem. It is due to interference, through blunt manipulation, with the system of pneumogastric nerves and their manifold anastomoses with the sympathetic plexuses, or to the accumulation in the blood of carbon dioxide, irrespective of the type of differential pressure used.

Relatively speaking, cancer of the cervical portion of the esophagus presents few technical difficulties. The actual removal of the growth, according to Davis,² is not in itself dangerous. But one must always reckon with the great dangers and the ill effects of a spreading infection when the esophagus cannot be closed completely. According to the location and extent of the lesion, these operations may be divided into four groups: (1) When the growth extends too far into the posterior mediastinum to permit of its removal, the esophagus must be closed with two rows of sutures and further operative procedures abandoned. (2) When a small part of the circumference of the esophagus is involved, the affected area may be excised and the wound closed. (3) When the growth invades the greater part of the circumference of the esophagus, but has not spread beyond the outer coat and is not more than 2 cm. in length, it may be possible not only to excise the affected portion, but also to effect an end-to-end anastomosis with sutures. As some leakage is apt to occur, drainage should always be provided for unless

¹ *Annals of Surgery*, July, 1910, p. 34.

² *British Medical Journal*, February 12, 1910, p. 363.

a Glück esophageal tube is inserted. (4) In the last group, approximation cannot be secured after removal of the growth; if it becomes necessary to excise a portion of the trachea, the latter must be sutured in the wound, and a tracheotomy tube tied in. The upper and lower end of the divided esophagus must be drawn out and sutured to the skin, the patient for a time being fed through the lower opening; the secretions escaping from the upper end are controlled by a tube passed down the pharynx, out of the upper opening and in again at the lower one. Later, the continuity of the esophagus may be restored by a plastic operation.

Esophageal Diverticula. This is perhaps the most satisfactory of esophageal lesions to handle, where, as is frequently the case, the diverticula are in the cervical portion. By means of the history and bismuth radiographs, an early and accurate diagnosis can be made. To wait until the patient is suffering from malnutrition is unpardonable, and seriously affects the prognosis. Preparatory to operation the ill effects of malnutrition should be overcome, the upper portion of the alimentary canal rendered as clean as possible, and no food should be given by mouth some time before operation, and the sac should be completely emptied before the operation is begun. Setten¹ advocates a preliminary gastrostomy, especially if the patient is underfed; it permits of more thorough cleansing of the upper digestive tract and enables nutrition to be maintained until the wound has healed, thus eliminating the principal danger of the operation.

C. H. Mayo² makes his incision along the inner margin of the sternomastoid muscle; the lobe of the thyroid is elevated, the lateral thyroid vein cut; the sac is opened and amputated, and the wound closed by continuous mattress sutures. The wound is washed with a weak solution of iodine and a temporary drain of rubber tissue inserted. After the operation, a large amount of saline solution is given by the bowel, and the patients are fed twice a day through a small rubber tube. Sips of hot water are permitted at rare intervals on the second day.

Setten passes an esophageal bougie on the tenth to the fourteenth day, and for a while every few days, then at gradually increasing intervals, and finally every few months. He has collected records of some 60 radical operations with a mortality of 16 per cent. In 48 cases of complete excision the mortality was 18.7 per cent., and of 5 cases in which a preliminary gastrostomy was performed, 1 died.

Peptic Ulcer. Peptic ulcers of the esophagus, as those of the stomach, may be due to the action of the gastric secretions. The ulcer is generally situated in the lower portion of the esophagus, although in some instances it extends upward for a considerable distance. The association of duodenal or gastric ulcers has been noted so frequently as to suggest a common pathogenesis. Stenosis of the pylorus, hour-glass contraction

¹ *Annals of Surgery*, March, 1910, p. 309.

² *Ibid.*, June, 1910, p. 812.

of the stomach, and any condition causing regurgitation are undoubtedly predisposing factors. The presence of the ulcer may be detected with the esophagoscope and a portion excised for microscopic examination. When there are no associated lesions of the stomach, the ulcer may be treated by local applications through the esophagoscope or by regulation of diet and medicinal measures. But if, as in most cases, there are associated lesions in the stomach or duodenum, attention must be directed first to these. In most instances, favorable results may be anticipated from a gastrostomy. Every source of irritation is thus removed and the danger of perforation and hemorrhage avoided.

Stricture. Lerche¹ advises, in the case of a tight stricture in the cervical portion, dilatation with or without division of the stricture. A filiform whalebone bougie is introduced and over this as a guide a small-sized perforated bougie is pushed through the stricture. If the latter is superficial and yields readily, the stricture can be rapidly dilated. After full dilatation is accomplished, the largest bougie is introduced at increasing intervals, the bougie being passed through the entire length of the esophagus and left *in situ* for ten minutes in very young children, somewhat longer in older children, and in adults from fifteen to thirty minutes. If the stricture is resistant, the esophagoscope should be introduced to determine the length and position of the stricture. The knife is then introduced and the necessary number of incisions made. In children, 1 to 1.5 mm. blades, and, in adults, 2 to 3 mm. blades should be used. If the stricture is valvular, two or more incisions are made; in annular and short tubular strictures, a number of incisions should be made radiating from the centre toward the periphery. In the case of long tubular strictures several sittings may be necessary, for, although the stricture may be cut and dilated sufficiently to admit the esophagoscope, the passage of the latter may injure the unelastic tissue. The procedure is slow but safe, and in adults can be done under local anesthesia. The author does not feel that gastrostomy is justifiable either for the purpose of feeding or for retrograde dilatation until his method of treatment has been tried.

When the stricture involves the entire circumference of the esophagus, Jackson² recommends the string-cutting method of Abbe modified for the use of the esophagoscope, so that the surgeon can work from above, and thus do away with a gastrostomy. The operation is performed by a string-cutting esophagotome, the bight of the string being carried down by a dilating metal guide to the face of the stricture, which is rapidly worn through by the to-and-fro travel of the string, at the same time cautiously dilating the stricture with a dilating esophagotome. The method has proved useful when the lumen of the stricture can be

¹ Surgery, Gynecology, and Obstetrics, October, 1910, p. 345.

² Laryngoscope, vol. xix, No. 10, p. 743.

found, but in the majority of the long-standing cases a dilatation or diverticulum exists above the stricture and frequently it is impossible to find the entrance to the stricture. In these cases the esophagoscope serves as a speculum, and obviates the danger of operating blindly.

THE MAMMARY GLAND

Chronic Cystic Mastitis. While the thoroughness with which radical operations are now performed and the earlier diagnoses that are now made has reduced the morbidity of mammary cancer, the limitations of surgical intervention are still such that on'y by recognizing conditions in the precancerous stage can the fatal incident of cancer be greatly reduced.

Under the title of "Prophylaxis of Breast Cancer," Handley¹ reviews the evidence upon which the belief is founded that chronic mastitis is a precursor of cancer, and refers to Bonney's investigation in which traces of chronic mastitis were found in all breasts removed for early carcinoma. Other writers have found malignant degeneration of chronic cystic mastitis in a fairly high percentage of the cases, as, for example, Speese² in 26 per cent. and Taylor³ in 50 per cent. of their cases.

The *diagnosis* of chronic cystic mastitis is not difficult, as a rule, but whether a malignant degeneration is already established cannot be determined either from the symptoms or from an operation. Malignancy is more likely to occur in women past the forty-fifth year of life, and, in many instances, the disease is of short duration, often only a few months. In the majority of early cases there are no signs by which malignant degeneration can be recognized. Enlargement of the axillary lymph nodes, slight inversion of the nipple, induration of the tumor, pain, tenderness, rapid growth, and discharge from the nipple may be seen in non-malignant cases as well. The diagnosis of early malignant transformation, therefore, cannot be made in the majority of instances until, at the operation, an incision into the suspected area reveals the carcinomatous tissue. In chronic cystic mastitis the tissue is tough and india-rubbery in consistency, and, as Handley states, has not the inelastic hardness of a typical carcinoma. The color is white or yellowish, with a trace of pink, and does not possess the gray tones usually seen in cancer.

The *treatment* of chronic cystic mastitis has been fully discussed in PROGRESSIVE MEDICINE, March, 1906. When malignancy can be diagnosed with certainty, the radical operation is indicated. There are a certain number of doubtful cases in which an exploratory incision into

¹ Practitioner, 1910, vol. lxxxiv, p. 463.

² Annals of Surgery, 1910, vol. li, No. 2, p. 213.

³ Ibid., vol. lii, No. 2, p. 253.

the diseased tissue may be necessary. Such an incision, in incipient cases, is comparatively free from danger, whereas at a late period it would almost invariably have a harmful effect. In the doubtful and early cases, the area of carcinomatous change is so small as to be easily overlooked, and great care must be exercised in the selection of area suitable for microscopic examination.

In view of the frequency of malignant degeneration, it is difficult to reconcile the teaching of Handley, who advocates medicinal treatment and local applications in young women, although he advises prompt operative interference when the disease is met with in older patients. While it may be true that a few cases treated expectantly may undergo involution, nevertheless I believe that the teaching is productive of more harm than good, because it countenances delay in the precancerous stage, and by so doing may be held responsible for many cases of advanced cancer. If we regard every breast tumor as potentially malignant, and certainly many cases of chronic mastitis, even in young women, are actually so, and advise immediate removal of the suspected tumor, we will, by so doing, cure a much larger percentage of cases, although we may operate in many instances in the precancerous stage.

While chronic cystic mastitis undergoes malignant degeneration more frequently than most benign affections, it must not be forgotten that a similar tendency has been observed in other tumors. The sudden enlargement of a tumor whose growth has been either slow or arrested should always be regarded as highly suspicious, even if only slightly adherent to the surrounding tissues. In de Quervain's¹ case, a cancer developed in the breast after the removal of a fibro-adenoma. Perhaps at the time of the operation the surrounding tissue was not normal. Striking changes in the tissues of a breast, with a well-circumscribed tumor, have been observed before. Small areas of such degenerated tissue can be easily overlooked and act as the starting point of a malignant tumor, which, in de Quervain's case, as well as in one recorded by Speese,² was predisposed by pregnancy. For these reasons de Quervain advocates removal of all fibro-epithelial growths, and believes that the safest mode of procedure lies in complete amputation of the breast, particularly if the tumor is a large one, if a tumor seemingly benign begins to grow rapidly, and if there are diffuse nodules. Much as one dislikes to perform any operation which is disfiguring and leaves the patient with a permanent defect, I am coming more and more to prefer complete removal of the breast to the so-called plastic operation which removes only the apparently diseased portion. Only by so doing can we give the patient anything like a reasonable guarantee against subsequent malignant invasion.

¹ *Correspondenzblatt für Schweizer Aerzte*, September, 1910, No. 25.

² *Loc. cit.*

We have pretty well conceived ideas now as to how much tissue should be removed in a radical operation, granting that there may be some who, as Handley, include even the fat over the upper segment of the rectus muscle. As to the mode of procedure, it is pretty generally concluded that the dissection should begin in the axilla and extend along the axillary vessels, working against rather than with the lymph stream. The method of repairing the defect after the dissection has been completed should be given more consideration, and there is probably no better way than that described by Jackson some years ago; in a more recent article he¹ reviews the essential points in his operation. His method of fashioning the flaps so as to obliterate the axillary fossa, a space which nature would otherwise have to obliterate by the formation of scar tissue, is the most important feature of his technique. Its significance, however, has been apparently overlooked by many. In none of Jackson's cases has there been any pressure phenomena, such as edema of the arm or pain in the distribution of the axillary nerves. The arm is not fixed to the chest, and the early and complete restoration of function is striking. Bandages or splints are not used, but from the outset the arm is carried in a sling and the use of the hand and arm encouraged. As a rule, the flap covers the entire defect without undue tension, and thus obviates the necessity of skin grafting.

The ligation of all vessels as near as possible to their point of origin does away with the use of a large number of hemostatic forceps, which entails loss of time and much inconvenience. The most difficult portion of the operation is completed before the breast is removed; the long exposure of an enormous area of raw surface, with its attendant shock, is thus done away with, and as soon as the breast is removed the wound is ready to be closed.

SERRATUS MAGNUS INVASION. In studying a serratus magnus invasion in a recurrent carcinoma of the breast, Henderson² was led to believe that the recurrences in the lower half of the scar might be due to the almost invariable practice of leaving intact the serratus magnus muscle, which, at the time of the operation, may be already involved. It is well known that the pectoralis major is frequently invaded by lymphatic permeation long before any physical attachment of the growth to the underlying muscle can be demonstrated. Might it not be possible that the serratus magnus be similarly affected in the early stage? To answer this question sections were taken from the serratus magnus in eight cases in which the growth was lying directly over the muscle, but in not one instance could any trace of cancer cells be found in the series of muscle sections, although processes of cells were visible

¹ Journal of the American Medical Association, 1910, vol. liv, No. 3, p. 179.

² British Medical Journal, October 23, 1909, p. 1221.

extending in the fascia right up to the muscle margin. Despite the negative findings to this series, Henderson believes the results will be reversed in the future, for if there are lymphatics in the pectoralis major which communicate at an angle with those in the pectoral fascia, the same arrangement is more than likely to be found in the serratus magnus. If this proves to be the case, the exposed portion of this muscle will have to be removed as a routine procedure, especially when the tumor directly overlies the muscle.

RÖNTGEN THERAPY. The beneficial action of *x*-rays in limiting epithelial hyperplasia in superficial forms of carcinoma is generally admitted, and many surgeons continually employ it after radical operations. Handley¹ recommends it in a certain proportion of cases of chronic cystic mastitis, in which operation is contraindicated, believing that a short course of *x*-ray treatment acts as a sedative to epithelial activity and as a prophylactic against cancer. He has not seen a case in which cancer developed after this treatment. It seems to me that he is placing too much reliance upon the *x*-ray and recommending a dangerous practice when he proposes, in women between the ages of forty and forty-five with a strong family history of cancer, a course of *x*-ray treatment to both breasts. I see no objections to the use of Röntgen therapy in inoperable cases in which, as Boggs² says, the treatment may be followed by cessation of pain, hemorrhage, and by the disappearance of offensive odors. That the mass will be reduced to such an extent as to make it subsequently operable is, however, highly improbable.

Accessory Breasts. Cases of supernumerary nipples are not uncommon, and instances of accessory lobes or breasts in the axilla are constantly being encountered. As a rule, such breasts are not supplied with nipples as in Knaebel's³ patient, who, when twenty years of age, noticed a painful tumor in the right axilla in the early months of pregnancy. The mass gradually enlarged, reaching the size of an orange, when lactation was established, having in the centre a nipple from which milk could be easily expressed. In the left axilla there were two spindle-shaped tumors in a corresponding position, both containing milk but without nipples. The accessory tissue gradually diminished in size and the milk secretion subsided. Aside from the pain and inconvenience they may cause, the accessory breasts must always be reckoned with as possible seats for cancer. Already many such instances have been reported, and no doubt in certain instances carcinoma in the axilla and infraclavicular region originated in these misplaced cells.

Hypertrophy of the Breast. Diffuse idiopathic hypertrophy is one of the rare lesions of the breast, and presents many points of surgical interest. The cause of the disease is unknown. It is still regarded as a

¹ Practitioner, 1910, vol. lxxxiv, p. 471.

² New York Medical Journal, November 12, 1910, p. 965.

³ Monatsschrift für Geburtshülfe und Gynäkologie, 1910, vol. xxxi, p. 547.

simple hypertrophic process involving all of the elements of the gland, but especially the part which, at the time, is the most actively growing tissue, namely, the glandular tissue during gestation, and the connective tissue at other times, especially during puberty. Albert¹ collected 70 cases, 62 bilateral and 6 unilateral, 3 affecting the right and 3 the left gland. The majority appeared at, or soon after, puberty or during gestation. Cases not associated with gestation are seen about the time of puberty, and, in some, menstruation only occurs after the hypertrophied breasts are removed.

Tuberculosis and Carcinoma. The association of these two infections is uncommon in any part of the body, and particularly so in the breast, where Klose² was able to collect only 17 examples. In the case he observed, the breast enlarged very rapidly thirteen months after childbirth; it soon became ulcerated and, together with the axillary lymph nodes, was removed. The dual processes were undoubtedly present.

¹ Journal of the American Medical Association, 1910, vol. lv, No. 16, p. 134.

² Bruns' Beiträge zur klin. Chir., 1910, Band lxvi, Heft 1.

INFECTIOUS DISEASES, INCLUDING ACUTE RHEUMATISM, CROUPOUS PNEUMONIA AND INFLUENZA

By JOHN RUIRÄH, M.D.

DURING 1910 the infectious diseases continued to occupy a very important place in medical literature. The contributions consisted chiefly of the usual number of clinical reports, which, while they do not add anything toward the advance of the subject from a scientific standpoint, are always of great interest to the practitioner of medicine who has to deal daily with many of the problems considered.

By far the most striking announcement during the year was that of Ehrlich and Hata on the subject of the cure of syphilis and of other diseases, treating those due to spirillæ and trypanosomes by the use of one or two injections of an arsenic derivative. This is noted below, and will be considered fully in the September number of *PROGRESSIVE MEDICINE*.

The next thing of importance is the renewed interest in anterior poliomyelitis and the brilliant discoveries concerning the experimental production of the disease, its epidemiology, and its symptomatology. Our entire conception of this disease has been changed by the recent reports. This subject is fully considered in the following pages.

Of special interest may be mentioned the contribution concerning the Mills-Reincke phenomenon, which, briefly stated, is, that when the death rate of a city is lowered specifically for any one disease, there will be a lowering of the total mortality. This is referred to in connection with the purification of the public water supplies.

The brilliant work of Ricketts and Wilder on Mexican typhus adds another chapter to the subject of the transmission of infectious diseases by insects, and in this connection the investigations of Sambon in regard to the transmission of pellagra by a certain species of sand fly are of particular interest, since pellagra has become one of the reasonably frequent diseases in this country.

The interest in typhoid and tuberculosis was continued. There have been many contributions upon the subject of both diseases, and paratyphoid has been studied with renewed interest and placed upon a firm bacteriological basis.

The culture of the leprosy bacillus is another feat in bacteriological technique which will undoubtedly prove of great value in investigations

of that disease, and an entirely new line of research has been opened by Ascoli's discovery of what he has named the meiostagmin reaction, which is apparently not only applicable to certain of the infectious diseases, but to malignant growths as well.

A review on infectious diseases would not be complete this year without some reference to Robert Koch, who, up to the time of his death, was the foremost figure and the acknowledged leader in the struggle against infectious diseases. This is not the place to speak of Koch's life or extendedly of his work, but it seems fitting to call attention to some of the things which he did to further our knowledge of transmissible diseases.

One of the first pieces of his important work was his researches on anthrax. He demonstrated the fact that the anthrax bacilli were living organisms; he watched their development in hanging-drop cultures, and discovered that they formed spores which in turn gave rise to the rod-like forms. After his demonstration of this, Cohnheim is said to have prophesied a brilliant future for the young investigator. He subsequently demonstrated that wound infection was due to bacteria, a point which had been believed before but which had not been definitely demonstrated, and that some bacteria have pathogenic power and some have not. He introduced many new methods, among which may be mentioned the use of Abbé's condenser, the use of homogeneous oils for the immersion lens, and the use of methylene dyes for staining. He also originated the solid transparent media and the plate methods for isolating the various forms of bacteria. These things seem so simple to us now that it is well to reflect on Naegeli's statement in 1877, that he had examined thousands of bacteria for over ten years and had not seen any necessity for dividing them even into two species.

Of course, the most important contribution was the well-known work on tuberculosis. This disease had been regarded as infectious. In 1843 Klencke had transmitted the disease to rabbits by means of injection of tuberculous material, and other observers carried on similar experiments, but it remained for Koch to demonstrate conclusively the presence of the tubercle bacilli in all the lesions, and to isolate and grow the bacillus in pure culture, and to reproduce the disease by inoculation of these cultures. The announcement of this discovery was made in 1882; it was a small document, but one which may serve as a model of completeness in every way. In the following year Koch went to Egypt to study cholera; he discovered the cholera bacillus and isolated it in pure culture, and suggested practical preventive measures for controlling epidemics of this disease. At this time, too, he made studies of the Egyptian conjunctivitis, and of amebic dysentery. In 1890 he published his communication on the use of tuberculin, and it is well to remember that he stated that it was a means of diagnosis in animals and human beings, and that he hoped, but he did not claim, that it

would be a means of cure, especially in the early stages of the disease. In 1891 he was appointed the director of the Institute of Infectious Diseases in Berlin. In 1896 he made a tour of South Africa to study the rinderpest, and while he did not find the cause of the disease, he introduced a successful method of immunizing animals against it by the injection of bile of animals that had died from the disease. He made further studies of the plague in India, and of surra, which is caused by a trypanosome and transmitted by the tsetse fly, thus confirming Theobald Smith's discoveries concerning the transmission of Texas fever. While in Africa he also studied malaria, and confirmed, by independent observations, the discoveries of Ronald Ross, and suggested the use of quinine as one of the means of preventing the disease in tropical regions, as he had observed that the malarial infection was very common in the native children, and that it was probable that they were one of the chief means of infecting mosquitoes. He was of the opinion that bovine and human tuberculosis were not identical, a belief which, in spite of the opposition to it, seems destined to be demonstrated. He made studies of typhoid fever and suggestions for the suppression of the disease which have been used with such success in Germany. In 1906 he went to the interior of Africa for the purpose of studying the sleeping sickness.

He and Pasteur rank together in giving to the world a wonderful series of discoveries in regard to disease and disease processes.

By far the most important contribution to the therapy of infectious diseases during the past year is that made by Ehrlich and Hata concerning the use of *dioxydiamidoarsenobenzol*, popularly known as "606." The discovery was the result of a painstaking investigation on the part of Ehrlich and his collaborators on the chemical side and of the animal experimentation carried out under the direction of Hata. The use of atoxyl as a curative remedy in diseases caused by trypanosomes, especially sleeping sickness, while causing in most cases a great diminution in the number of trypanosomes, usually left some alive, and these, curiously enough, seemed to develop a resistance to arsenic, so that, even though the individual was given subsequent doses, the parasites were not killed. Furthermore, in a certain proportion of cases optic neuritis and other unpleasant sequelæ of arsenic poisoning supervened.

Ehrlich conceived the idea that if it were possible to find some drug which could be injected into the body without deleterious effect, and at the same time would be poisonous to trypanosomes, he would be able to sterilize the body completely with one or possibly two injections of such a substance. He has referred to this as *therapia magna sterilizans*. The generally accepted chemical formula for atoxyl was found to be incorrect, and having determined that with atoxyl as a starting point it might be possible to produce numerous arsenic preparations, Ehrlich and his assistants started a slow and painful search for the necessary

compound. It was not until the 606th preparation had been made and tested that the desired drug was found. It was found that this preparation, when given in sufficient doses, would kill trypanosomes and spirochetes. The experiments were carried on with spirillosis of chickens, and with syphilis. The experiments with syphilis were done upon monkeys, and since it has been found that rabbits could be infected with syphilis, especially if inoculation were made into the testes, these animals were used in the experiments. Having determined the value of the drug by laboratory investigation, some of Ehrlich's assistants injected into themselves what was considered the proper dose for the human being; as this experiment was not attended with any bad results, arrangements were made to have the drug tested by competent scientific observers throughout the world. The results reported so far have been truly marvellous. The literature of the subject is entirely too large to be mentioned here, and the subject will be taken up in detail in the September number of *PROGRESSIVE MEDICINE* under the heading of Syphilis.

Among the more important publications thus far are the monographs by Ehrlich and Hata, and of Wechselmann. In addition to these may be mentioned the work of Schrieber and Hoppe,¹ who found that the drug was more effective when given intravenously. The work of Wechselmann,² Neisser,³ Loeb,⁴ and Treupel⁵ must all be mentioned in speaking of the experimental work on syphilis. A collection of reports will also be found in the *Deutsche medicinische Wochenschrift*, October 13, 1910.

There have been few or no untoward symptoms produced by the drug, but abolition of the knee-jerk and other reflexes, extreme constipation, rectal tenesmus, and retention of the urine have been mentioned by Bohac and Sobotka.⁶

The fatalities which have occurred in connection with the use of the drug have been in exceedingly malignant cases of syphilis, in which death would have been expected in any event.

The drug is unstable, must be kept in vacuum tubes until used, and great care must be taken to insure a perfect solution. From 0.3 to 0.6 gram is injected either subcutaneously into the muscles, or intravenously, and Iverson has suggested the use of 0.4 to 0.5 gram intravenously, followed in from two to four days by a second injection given subcutaneously, or into the muscles. In addition to its apparently specific action in the spirillosis of chickens and of syphilis, Iverson found

¹ Münchener medicinische Wochenschrift, July 5, 1910, p. 1430.

² Berliner klinische Wochenschrift, July 4, 1910, p. 1261.

³ Deutsche medicinische Wochenschrift, June 30, 1910, p. 1212.

⁴ Münchener medicinische Wochenschrift, July 26, 1910, p. 1580.

⁵ Deutsche medicinische Wochenschrift, July 28, 1910, p. 1393.

⁶ Wiener klinische Wochenschrift, July 28, 1910, pp. 1099 and 1130.

that in the few cases of relapsing fever available it had acted promptly with remarkable results. Strong found that excellent results could be obtained in frambesia. In addition to these diseases, those caused by trypanosomes can probably be cured by its use, and favorable results have been reported from its use in sleeping sickness. In addition, Hallar has used the drug with wonderful results in two cases of small-pox, and Werner and Nocht have found it to be a specific in malaria.

This belief of Ehrlich of sterilizing the entire body by one or two injections opens up a new field in the therapeutics of infectious diseases, and it may be found that this preparation may be of value in diseases caused by other parasites, such as the various forms of bacteria, or if not, a search should be undertaken to find a preparation which will act in a similar manner.

The Serodiagnosis of Syphilis. Brieger and Renz¹ have made an interesting communication regarding the serodiagnosis of syphilis, which may be noted briefly at this time owing to the great interest in regard to serodiagnosis in general. It is well known since the researches of Wassermann, Neisser, and Bruck, that a great number of observers have attempted to replace the original complicated reaction by some reaction more simple.

Brieger and Renz have tried to substitute a different amboceptor for the one proposed by Wassermann and his collaborators, that is, the serum of a rabbit rendered specific against the blood of a sheep by repeated injections of this blood. After having tried a large number of substances, it was found that chlorate of potash, which is known to have hemolytic properties, was the most efficacious, and in 65 cases, in most of which repeated trials were made, they were able to obtain the same results as with the hemolytic amboceptor of Wassermann. In these experiments a solution of 1 gram of chlorate of potash to 150 grams of physiological salt solution was used, and this was prepared half an hour before each test was made. They state that it is important not to use solutions after they have stood about. The remainder of the technique is the same as in the original reaction.

The Meiostagmin Reaction. An entirely new test for infectious and possibly for some other diseases has been suggested by Ascoli.² The test is of a physiochemical nature, and is based upon the difference in the surface tension of an immune serum to which its specific antigen has been added. The surface tension is tested before and after incubation for two hours at 37° C. After incubation, in positive tests, there is a lowering of the surface tension, consequently a decrease in the size of the drops, and therefore more drops in a given quantity. The number of drops is tested by means of the Traube stalagmometer.

¹ Deutsche medicinische Wochenschrift, December 16, 1909.

² Münchener medicinische Wochenschrift, January 11, 1910, p. 63.

The first experiments were made upon typhoid. The blood serum of patients who gave the Widal reaction in dilutions of from 1 to 180 to 1 to 360 was used, and the antigen employed was the alcoholic extract of the typhoid bacillus made according to the method of Neusser and Shiga. The serum was diluted 1 to 10 and the antigen was used in dilutions of from 1 to 100 to 1 to 1000, the diluent in both cases being 0.85 per cent. sodium chloride solution, 9 c.c. of the diluted serum and 1 c.c. of the diluted antigen being used for each test. The number of drops determined, the solution was placed in an incubator for two hours and allowed to cool to room temperature and the number of drops again determined. The difference in the number of drops is not much, usually from 1 to 3, but the reaction is sharp and constant. The controls and the solution before incubating usually give about 57 drops to the 10 c.c., while the positive tests show 59 to 60 drops.

Using a similar method, Izar¹ determined that the reaction was not only useful in the diagnosis of typhoid, but also of tuberculosis, echinococcus disease, and the hookworm disease; the constancy and reliability of the test in typhoid was confirmed by Izar, and also by Vigano,² while Alberto Ascoli found that the reaction was also of great value in the foot and mouth disease of cattle.

It appears that this method of diagnosis may also be applied to carcinoma and sarcoma, and, in 62 cases with malignant tumors, 58 gave a positive reaction. Perhaps the most striking experience with the test was that of Izar, who was given the blood from two leprosy patients who gave the Wassermann reaction. He was merely told that the blood was from a patient that gave the Wassermann reaction, but nothing further about the diagnosis. Both of these cases gave a negative reaction for syphilis.

Further investigation is needed to determine the exact value of this test, the shortcoming of it from a practical standpoint being that it requires unusually skilled and accurate observation, and that the test must be done by an exceedingly reliable and well-trained laboratory worker.

The Purification of the Public Water Supplies, and the Decrease in Mortality of Diseases other than Typhoid Fever. It has been pretty well demonstrated that the purification of polluted water supplies lessens the mortality from typhoid fever among persons using the water for drinking and other domestic purposes. In 1893 and 1894 two independent observations were made relative to the lowering of the general death rate, apart from the lessening in typhoid. These observations were made by Mills, in Lawrence, Massachusetts, and Reincke, in Hamburg, Germany. About the same time Hazen turned his

¹ *Munchener medicinische Wochenschrift*, April 19, 1910.

² *Ibid.*, August 9, 1910.

attention to this subject, and in 1904, after an examination of the death rates of certain cities which had improved their polluted water supplies, he concluded "that where one death from typhoid fever has been avoided by the use of better water, a certain number of deaths, probably two or three, from other causes have been avoided."

In order to test the truth of this statement concerning what is generally known as the Mills and Reineke phenomenon, Sedgwick and MacNutt¹ have made a study of the death rates from various diseases in a number of different cities, and have demonstrated that there is no question concerning the fact that immediately following the purification of water there is a marked lowering in the mortality from various diseases. This includes the various inflammatory diseases of the respiratory organs, pulmonary tuberculosis, diarrheal and gastro-intestinal diseases of infants. There is a striking decrease both in the general mortality under five years of age, and also of the total death rate minus the typhoid component.

To those interested in public health a careful study of this article is especially recommended.

It is also interesting to note that no particular change takes place in diseases of the kidney, or in apoplexy. The relation of infant mortality to water pollution is very striking. The explanation of the reduction of the death rate in these various diseases is still a matter of question, and is well worth the study of health officers and sanitarians. It seems curious that the attention of the profession has not been called to this striking fact earlier.

Street Dust as a Factor in Spreading Disease; Methods of Removal. Anders² has called attention to the injurious effects of street dust. This may cause disease in two ways. A certain amount of the dust does not contain germs, and its effects are chiefly irritation which it produces in the nose, throat, and bronchial tubes; of course, if the dust is very abundant, it may lead to deposits in the lung tissue, and subsequent connective-tissue changes. Of great importance is the fact that the dust may contain disease germs which often find a very favorable soil in the irritated mucous membranes. It is not probable that either the diphtheria bacillus or typhoid bacillus are transmitted in this way very often, because neither of these germs withstand light or drying. It is probable that scarlet fever, whooping cough, and pneumonia occasionally may be set up in this way. Tuberculosis is one of the greatest dangers, as the sputum when completely dried, so that particles are capable of floating in the air, may be infective for eight or ten days. The acute and chronic catarrhal diseases of the upper air passages certainly bear a close relation to the amount of dust present, and the

¹ Journal of Infectious Diseases, August, 1910, p. 489.

² Medical Record, October 1, 1910, p. 563.

colon bacillus and various other bacteria are doubtless responsible for a certain amount of trouble.

The foodstuffs exposed in open markets should be adequately protected from dirt and dust, a thing which rarely or never happens in our American cities, and furthermore, to lessen the transmission of disease by street dust, satisfactory methods of cleansing should be used. It is possible that the solution of the problem may come through the use of vacuum street cleaners, such as are already in use in Berlin. The use of oil on the road, watering the districts to be swept, and street sweeping at night will also help. Placing the cleansing of the streets under the Department of Health should be considered, as by this means prompt removal of dirt may be obtained. Our American cities are exceedingly lax in recognizing both the dangers and the discomforts of street dirt.

The Common Drinking Cup in the Transmission of Disease. The *Vermont Medical Monthly*, for March, quotes the result of some of the investigations made by Davison on the presence of bacteria on drinking cups. The first cup examined was one of thin glass which had been in use nine days in a school. It was broken into a number of pieces and stained for examination. It showed that human cells scraped from the lips of drinkers were so numerous on the upper third of the glass that the head of a pin could not be placed anywhere without touching several of these pieces of skin. It was estimated that there were at least 20,000 such pieces on the glass. Bacteria were very numerous both on the cells and between them. There were not less than 100,000 bacteria on every square inch of the glass. Saliva running down on the inside of the glass had carried the bacteria to the bottom, but there were one-third less at the bottom than at the brim. To determine how much was left by each drinker, glass slides were brushed against the lips as a cup would be in drinking. Each one of these showed about 100 cells and 75,000 bacteria to each slide.

Other cups examined had been in use for several months, apparently without having been washed. Animals inoculated with the washings from these cups developed tuberculosis, and one animal developed a meningococcus infection. Besides this, streptococci and staphylococcus aureus were also demonstrated. By careful inquiry it was then learned that several pupils in the school from whom the tubercle-bearing cups were secured were then sufferers from tuberculosis.

The Bacterial Pollution of the Atmosphere by the Mouth Spray. There have been all sorts of opinions held as to the amount of danger there is through infection of the air, and sanitarians are coming more and more to the conclusion that very few if any diseases are transmitted by the atmosphere as such. The virus causing the disease, if it is transmitted by aerial means, is carried on dust and in the fine spray of saliva and mucus which is thrown out upon talking or coughing.

The question of the importance of the mouth spray as a means of spreading disease, and particularly tuberculosis, has been considered by many observers, and numerous studies have been made, beginning with Flügge, in 1897.

Winslow and Robinson¹ have restudied this subject and have given a résumé of the investigations of other authors.

There seems to be no question that a large number of bacteria are discharged in the act of speaking, and may be transmitted to considerable distances. Positive results were obtained within 7.5 meters of the speaker, and the number of bacteria was largely increased by coughing or sneezing. In most instances, however, the spray from the mouth is more or less coarse, and falls like rain rather than being suspended like mist in the air, so that, as Koeniger has shown, some 60 per cent. of the bacteria in the mouth spray disappeared from the air in ten minutes, and after twenty minutes less than 10 per cent. of the original number remained.

There is no question that in some tuberculous patients there may be large numbers of tubercle bacilli discharged, and one can only repeat the practical recommendation of Flügge, that during strong paroxysms of coughing the consumptive should keep at arm's length from his companions and should hold a handkerchief before his mouth. In work rooms, offices, and such places, the space between the heads of the workers should be at least one meter.

The Rat in its Relation to Public Health. Under the direction of Surgeon-General Walter Wyman² there has been prepared a series of eighteen articles on the relation of the rat to public health. The rat has not been known to be of any use to man, and is a dangerous and destructive foe. Rats follow men all over the world, and breed with such exceeding rapidity that their elimination is almost an impossibility. At various times the inhabitants of certain places have had to practically give up their occupations to fight the rat in order to preserve their health and property. The economic losses caused by rats in the United States alone has been estimated between \$35,000,000 and \$50,000,000 a year. They destroy merchandise and all foodstuffs, to say nothing of their destruction of foundations of buildings and the like. Further than that the rat is a carrier of a number of diseases, among which perhaps the most important is plague, and the rat is also probably responsible for much of the trichinosis; some ten other parasites which may also affect man have been noted in the rat. They have other diseases which have not been as yet associated with disease in man, but which have some interest from a standpoint of infectious diseases, and among these may be mentioned rat leprosy,

¹ Journal of Infectious Diseases, January, 1910, p. 17.

² United States Public Health and Marine Hospital Bulletin, 1909.

and rat cancer, the latter being one of the forms of easily transferred neoplasm. In connection with plague, one has to also consider the question of the flea. It is now known that the flea gets the plague bacillus from the rat, and then transmits it to man. In fighting epidemics of plague, the most efficient methods found have been the extermination of fleas and especially of rats. In plague districts the most efficient method of limiting the spread of the disease is the adoption of a style of architecture which prevents the rats from finding a foothold. Single-walled dwellings built above ground have demonstrated their usefulness in the Philippines. This report should call attention to all those interested in public health to the importance and necessity of ridding dwelling places, markets, and other buildings of this troublesome pest.

Experimental Researches upon the Relation between Shock and Infection. The interesting question of the relation between shock and infection is one which has been discussed very frequently and is even today not well understood. Considerable experimental evidence has been brought forward to prove that infection is slowed by shock, owing to the slower exchange between the blood and the tissues. Among such experiments are those of Galeazzi, who believes that the bacteria penetrate much more slowly into the circulation, and therefore the toxins are absorbed less rapidly than in the normal state. This opinion is largely held by the French school, and opposed to this is the idea that shock has no influence one way or the other on wound infection, an opinion largely held in Germany and exploited in the recent treatise by König and Hildebrand. Türk believes that by the result of his experiments he has proved that shock favors infection.

In order to throw some light on this perplexing problem, Gibelli¹ made a series of experiments upon guinea-pigs and rabbits, and is of the opinion that, in animals in a state of collapse, penetration of bacteria into the circulation is not retarded in any way, and that the bacteria are even more numerous than in the control animals. In the animals in which the shock was not sufficient to cause death and in which the controls lived, death supervened in those which were inoculated, even when the cultures were very much attenuated. In every case under like conditions the animals inoculated in a state of collapse died before the controls, and the number of colonies which developed in the blood of the animals in a state of collapse was greater than that in the control animals. Gibelli's experiments were carefully carried out, and the results seem to show rather conclusively that shock favors infection and permits of the more rapid growth of bacteria.

The Relation of Helminthic Infection to Eosinophilia. White² has made a study of eosinophilia in patients infected with various intestinal

¹ *La Semaine Médicale*, December 15, 1909, p. 591.

² *Lancet*, July 30, 1910, p. 299.

parasites. The greater the number of parasites present, the greater the eosinophilia, and the eosinophilia is greater when there are two or more kinds of parasites than when only one kind is present. The greatest eosinophilia is noted between the ages of twenty and forty years, after which the effect of the parasites is less noticeable. It is less marked in individuals suffering with tuberculosis.

The Use of Soamin in Infectious Diseases. There has been a search for an arsenic preparation for use in the various spirochetal and trypanosome infections, it being necessary to have a preparation which can be administered subcutaneously or intravenously, and one which is active against the parasites and at the same time non-toxic, or comparatively so, for the human tissues. Apparently this has been realized in the dioxydiamidoarsenobenzol of Ehrlich and Hata.

Atoxyl, while fulfilling these conditions to a certain extent, has not given the results in practice which had been hoped for it under the present methods of its use, although it was a great advance over the previous forms of arsenic medication.

Soamin (sodium para-amino-phenyl-arsonate) has been suggested as a substitute, and has been used in quite a number of the infectious diseases. It is too early to make any definite statements regarding its value. It seems to be non-toxic, it may be given in doses up to 1 gram; and seems to be reasonably stable. It is stated that it is incompatible with the salts of the heavy metals, but Van Someren¹ claims to have used soamin injections along with mercury, giving both together, with no untoward results. Van Someren believes that this is the best arsenic preparation and that his results were, on the whole, fairly satisfactory in connection with sleeping sickness.

The drug has been used in other forms of infection, for example, Johnson² claims to have gotten good results by its intravenous injection in cerebrospinal fever. It has also been used in the treatment of syphilis.

Lundie and Blaikie³ have used the drug in cases of tuberculosis, and they believe that in certain cases there is a very distinct and remarkable improvement following the use of the drug, although they do not consider it in any sense a cure for tuberculosis. They were led to use the drug from the results of Van Someren in two cases of leprosy. This last observer was called upon to treat a leper who insisted that he had sleeping sickness. There was no evidence of it, but the man was so possessed with the idea and so persistent in his request to be treated that a course of injections were administered. He was surprised to

¹ Treatment of Sleeping Sickness, *British Medical Journal*, January 22, 1910, p. 195.

² Intravenous Injection of Soamin in Cerebrospinal Meningitis, *British Medical Journal*, January 22, 1910.

³ Treatment of Phthisis and Other Conditions by Arylarsonates, *British Medical Journal*, January 22, 1910, p. 196.

find that the leprous tubercles improved to a great extent, and this observation led to its use in other cases with similar results.

As far as is known at present, no cases of blindness have followed the use of soamin, which is one of the objections to the use of atoxyl. It is probable that only the specimens of atoxyl which have undergone changes will produce optic atrophy.

The Infection of a Stillborn Infant with Amebiform Protozoan. Smith and Weidman¹ describe a remarkable example of extrauterine infection. The case was one of an infant, dead at the time of delivery. There was nothing of special interest in the history of the mother or of the pregnancy. The dead fetus weighed seven and one-half pounds, and was in a poor state of nutrition. Its appearance, however, was that it had not been long dead and, as a matter of fact, active artificial respiration was performed for a period of half an hour in the hope of resuscitation. The gross inspection showed nothing of interest, so only small pieces of tissue were taken from a limited number of organs for future microscopic examination. The subsequent examination of these showed protozoa in the kidney, liver, and lung, a minor congestion of all three organs, and a moderate grade of cloudy swelling of the kidney and liver. In the kidney, attention was attracted to a minute focus of lymphocytes which was composed almost entirely of small mononuclear round cells with a few polymorphonuclears mixed. Further studies showed the presence of the protozoa. The authors have suggested the name of *Entamoeba mortinatalium* from the circumstances attending the discovery.

As far as I know, this is the first instance of amebic infection of the fetus, and this case throws a new light on the possible causes of fetal disease and the possible causes of fetal death.

Actinomycosis. Lord² has made a study of the contents of carious teeth, and has found that organisms having the morphology and staining reaction of actinomyces have been found in smear preparations (11 cases) and in serial sections (5 cases). They are present in such numbers as to suggest that they play a fundamental part in dental caries. Typical actinomycotic nodules have been produced by the intraperitoneal inoculation of guinea-pigs with the contents of carious teeth, and these small tumors showed typical club-bearing actinomyces granules.

Israel, as early as 1878, noted the presence of the actinomyces in carious teeth, and other observers, chief among whom must be mentioned Wright, have also found the organism in the teeth, and Wright has prophesied that actinomyces might be found as a normal inhabitant of the mouth and the alimentary canal.

¹ University of Pennsylvania Medical Bulletin, July and August, 1910, p. 285.

² Boston Medical and Surgical Journal, July 21, 1910, p. 82.

McCleary has recently called my attention to the fact that he has found, in sections of tonsils, organisms having the staining reaction and general appearance of actinomycosis, but without the clubs. It is an undoubted fact that the disease is much more common than is ordinarily supposed, a point to which I have already called attention some ten years ago when I collected all of the American cases occurring in man. Following the publication of my article which called attention to the presence of the disease in America, there was an immediate increase in the number of cases reported. If all cases in which pus is found containing the typical sulphur granules were studied with a view of determining whether or not the disease was actinomycosis, it would undoubtedly be found in many instances.

About two years ago Widal¹ described the serum diagnosis in actinomycosis, and since that time he has observed four other cases, in all of which he was able to obtain a positive reaction. He has made an advance in being able to preserve the cultures, sterilized by means of formalin vapors which does not alter their agglutinability.

Actinomycosis. See Serodiagnosis of Sporotrichosis.

Intestinal Obstruction from *Ascarides Lumbricoides*. Venning² has reported a most interesting case in which there was intestinal obstruction from the presence of round worms, and has found that there are at least five undoubted cases in the literature, in all of which the diagnosis was made at autopsy or at operation.

While round worms are supposed to be able to cause obstruction, it was not until 1887 that Bordononi reported an undoubted example.

The enormous number of worms which may be present without causing obstruction is a matter which has been commented upon numerous times, the number passed in several months in some cases running into the thousands.

Venning's case was a child, aged two and one-half years, who had a history of having worms and of not being well; there was pain in the abdomen and great restlessness; there was no nausea or vomiting. The abdomen was not very tender, but the intestines seemed to be filled with masses which were plainly palpable through the thin abdominal wall, the worms forming these masses being distinctly felt. Ten worms were passed during the night and the following day the child was brought to the hospital for operation, there being at this time considerable distention of the abdomen. The small intestine seemed filled with worms. Twenty-four inches of the jejunum was distended almost to the point of rupturing. The bowel was opened and the worms extracted, it sometimes being necessary to take them out one at a time until the mass was untangled. Another impaction was found

¹ La Semaine Médicale, May 18, 1910, p. 238.

² Journal of the American Medical Association, June 18, 1910.

in the middle of the ileum, and about ten inches of this was also opened; the last impaction was found in the secum. The appendix was also filled with the worms. The child died some six hours after the operation from shock; 273 worms were removed at the time of the operation, and there were 100 or more left in the bowel, as only the large masses were removed by the surgeon.

Balantidium Coli Infection in Man. Bel and Couret¹ report the first case of infection with this parasite to be carefully studied both clinically and pathologically that has occurred in North America. The patient was a native of Louisiana who had never left the state.

Some authorities are of the opinion that this organism is of a harmless nature, but Strong, Solowjew, and others, believe that it is capable of producing not only catarrhal and ulcerative lesions in the large intestine, but that these may result fatally. Strong was able to collect, in the entire literature, but 117 cases of balantidial invasion in man, of which but 1 is reported from the United States. Two other cases, however, have been noted in this country although not reported, 1 in the Boston City Hospital by Mallory, and 1 in the Johns Hopkins Hospital by Van Wart.

The organism is one which not only occurs in the tropics but in the temperate zones, and even in the cold climates of Finland and Russia. The organism has been found in the intestine of swine, where it apparently does not produce any very serious disturbance, and Brooks has found it in an epidemic of dysentery among the apes in the New York Zoological Garden. The organism has been found in sewage and also in drinking water in London, and these facts suggest the possibility of infection through the water supply.

About 25 per cent. of the reported cases have occurred from direct contact with swine, or following the use of pork products as food. In one instance, reported by Chichulin, every member of one family was affected after eating sausage from a hog which had harbored balantidia.

The case of Bel and Couret occurred in a negro, aged forty years, who was admitted to the hospital suffering from diarrhea, abdominal pain, and tenesmus. He was a railroad hand by occupation, but kept pigs at home and often looked after them himself. He had frequent movements of the bowels, and some of the stools contained blood; the *Balantidium coli* was always found in large numbers. Repeated examinations did not show the presence of any other parasite. The patient gradually grew weaker, and died apparently from exhaustion. The large intestine was swollen, thickened, and edematous; the mucosa was studded with shallow ulcers, the exudate from which showed many living parasites.

The parasite belongs to the ciliated infusoria, is egg-shaped, and

¹ Journal of Infectious Diseases, October 25, 1910, p. 609.

measures 0.07 to 0.1 mm. in length by 0.05 to 0.07 mm. in breadth, and has a funnel-shaped mouth situated on its ventral portion a little below the anterior or more pointed pole. The organism has a thick layer of long cilia with a circular motion which suggests in appearance the action of a rotary lawn sprinkler. These cilia are the means of conveying food to the mouth. Sometimes the organism becomes encysted. The organism will not grow on the ordinary media, and ordinarily injecting the organism into cats, dogs, rabbits, pigs, or monkeys gives negative results. It has been found possible, however, to infect cats with this organism.

This adds another parasite to the list of those which are capable of causing dysentery, and which has to be taken into account in differential diagnosis.

Bilharziasis. Until recently the bilharzia was practically unknown in America. According to Stiles, it has been found twice, once in a "Midway" patient in Chicago during the World's Fair, and once in New York, while still another case has been reported from Georgia, which was evidently included outside of the United States.

Brayton¹ has called attention to the fact that in the Isthmus of Panama it has been reported 104 times since 1904.

This parasite was formerly supposed to belong exclusively to Africa; it is said that it is found in one-third of all autopsies made in Egypt. It has spread to the natives of the Uganda, Kongo, Tunis, Abyssinia, Soudan, Natal and the interior. It has also been found throughout the East, and has footholds in India, China, and the Philippines. It has been found in Martinique and other islands.

The bilharzia is a small, milk-white parasite, measuring 1 cm. in length. There are both males and females. The eggs are spindle shaped and measure 0.16 cm. in length, that is, $\frac{1}{200}$ of an inch. Fresh water seems to be essential for the birth and subsequent life of the embryo, but, beyond this, little is known of the life history and the cycle of the parasite. It is possible, inasmuch as it remains alive for only a few days, that some fresh-water animal—a mussel, snail, or fish—or possibly some fresh-water vegetable, acts as an intermediate host.

Infection is long drawn out and individuals may harbor the parasites for many years. It is not known how the parasite enters the body. Bilharz thought it was taken into the stomach with impure drinking water, or with some mollusc, fish, or vegetable. It is found with greatest frequency in males, especially those who work in water, so it has been supposed that, like the guinea-worm, it may be acquired by bathing or working in water. Once in the body, the adult parasites live chiefly in the portal vein but the young worms may be found in the liver, in the intestinal veins, in the bladder walls, and the pelvic bloodvessels

¹ Journal of the American Medical Association, April 30, 1910, p. 1437.

of both sexes. In the lungs, the parasites may block the bloodvessels and produce infiltrations which may be mistaken for tuberculous deposits. They may cause gallstones, and also cirrhosis of the liver. The parasite may become attached to the mucous membranes lining the genito-urinary tract and produce inflammation and hemorrhage, and may be the starting place of stone. It is very probable that the parasite may also cause a recurrent dysentery. The disease proceeds over long periods and has a tendency to relapse, but is generally not fatal.

The *diagnosis* is usually made by an examination of the stools or of the urine. The disease is usually *treated* by keeping the patient at rest, using a milk diet, saline irrigations, and quinine. No treatment is specific, and other drugs, such as male fern, santonin, and methylene blue, have been used in the treatment. Surgical interference should not be undertaken, as results are liable to be bad.

THE BILHARZIA HEMATOBIA IN EGYPTIAN MUMMIES. Ruffer,¹ the president of the Sanitary Maritime and Quarantine Council of Egypt, has discovered a process by which mummified tissues can be prepared for histological examination, and has studied the organs from mummies of the twentieth dynasty (1250-1000 B. C.). In the kidneys of two of the mummies he demonstrated a large number of calcified eggs of the bilharzia hematobia, and his diagnosis has been confirmed by other authorities. Several other kidneys examined showed marked lesions. Among other things, there was one with multiple abscesses.

Cerebrospinal Fever. Monzolis and Loiseleur² have made an interesting observation on two cases in which they found the meningococcus in the blood without symptoms of meningitis. These cases occurred in the course of a light epidemic of cerebrospinal fever at Laval.

In the first case, the organism was found in blood cultures, and also from a pleural effusion; in the second case, the organism was found in the blood on the twentieth day of the disease, the symptoms having been recurring attacks of fever, coming on every two or three days.

These observations may throw some light upon curious atypical cases of cerebrospinal fever met with during epidemics. The authors neglected to state whether they examined the cerebrospinal fluid in their cases or not, but it is to be presumed that such observations were made.

BLOOD PRESSURE IN CEREBROSPINAL FEVER. Robinson³ has made a study of the blood pressure in cerebrospinal fever, and also of the intracranial tension, and found the latter to be almost constant. Blood pressure of a moderate degree is not infrequently seen in the early, acute stage of the disease, when exacerbations and symptoms occur

¹ British Medical Journal, January 1, 1910, p. 16.

² La Semaine Médicale, March 9, 1910, p. 118.

³ Archives of Internal Medicine, May 15, 1910, p. 482.

late in the disease, and when it takes on a marked aspect. As a general rule, if the symptoms are severe, the blood pressure is high; during convalescence and when the symptoms are not severe, the pressure is low. The blood pressure falls with the withdrawal of the spinal fluid by lumbar puncture, but this withdrawal has no constant effect upon the blood pressure.

Cholera. FISH AS CARRIERS OF CHOLERA SPIRILLA. At the instigation of the Sanitary Commission at St. Petersburg, Gran and Schor¹ made a study of the fish that lived in an aquarium, the water of which had been contaminated with a culture of cholera spirilla. After twenty-four to forty-eight hours, the cholera germs could be recovered from the digestive organs, and also from the flesh of the fish. This corresponds to the results obtained by Remlinger and Nouri.²

It is curious to note that the character of the water has considerable to do with the success of the experiment. In comparatively pure or in boiled water, subsequently contaminated with the cholera germs, the results were constantly positive, while with very dirty river water, most of the results were negative, which would seem to point to the destruction of the cholera germs, or the interference with their growth by the other organisms in the water.

THE MANAGEMENT OF A CHOLERA CAMPAIGN. McLaughlin³ has reviewed the means used in the Philippines in fighting cholera. The experience of one who has done practical work in successfully fighting such a disease as cholera is worthy of notice, especially at this time when we may expect to see widespread cholera owing to its great prevalence in Russia, and in south Italy in 1909. While his suggestions were made for fighting the disease in the Philippines, it is not uninteresting to review the means used which might be applied in any country.

The campaign is divided into two parts: (1) The preventive measures, (2) the suppressive measures. In order to properly cope with the disease it is necessary to establish a system of securing and recording information. These reports should be made daily, and should be made by telephone or telegraph if possible, in order to save time. The area under consideration should be divided into districts and each officer should report daily and be responsible for the knowledge of conditions in the territory under him. One of the greatest difficulties experienced in the organizing is the proper force for sanitary work, and some places where the districts are poor it may be necessary to utilize the police officers. Where it is possible to have regular sanitary inspectors, who are more or less trained in their work, it is, of course, much better. The group of sanitary inspectors should be under one responsible head who should have some means of being transported quickly over his entire district so that he may supervise the daily work of all under

¹ *Vratch*, May 30, 1910.

² *La Semaine Médicale*, 1908, p. 117.

³ *New York Medical Journal*, December 4, 1909.

him. An additional force will be required for disinfection. Every town has its local organization, and in case of larger towns they may be divided up into districts.

The next step is the enactment of necessary ordinances, if such are not already in force, and these should provide for the proper disposal of feces, the collection of garbage, the sanitary maintenance of the premises and the proper care of food and drink. Violations of these ordinances should be punished by adequate penalties.

House-to-house inspection should be undertaken first, to find cases of suspicious illness, and secondly, to maintain the proper degree of cleanliness. The inspection should be made politely, every effort being made to secure the coöperation of the inhabitants. The inspector should know the number of people in the house and should see all of them. He should leave a circular which gives information concerning the disease, a copy of one in actual use is given below. The inspector should insist upon the water and milk being protected from flies, and upon the removal of all garbage, refuse, and filth. If he finds a case of suspicious illness, he should quarantine the house and notify the chief inspector and remain as a guard at the house until the inspector arrives, when he may continue his house-to-house inspection.

In poor towns where there is no sewer system, the fecal matter should be carefully disinfected by the use of lime, or other suitable methods. The water supply is of the greatest importance. A pure supply should be secured, if possible, for all inhabitants. If the water comes from rivers, streams, or wells, if these cannot be protected from pollution the water should be boiled. Very careful supervision should be made over the food supply; the unnecessary handling of foodstuffs should be prevented, and all food should be protected from flies and insects. A campaign of education is very important and every effort should be made in the instruction of the people in the prevention of cholera. Cholera Circular No. 1, which in the Philippines is printed in the principal native dialects, is given below:

Cholera has reappeared in the city of Manila and its vicinity. THIS DISEASE CAN BE INTRODUCED INTO THE SYSTEM ONLY THROUGH THE MOUTH. It is caused by organisms too minute to be seen except with a microscope. These organisms are readily killed by heat, and the disease may, therefore, be successfully combated by the proper use of fire and hot water, which are at the disposal of everyone.

To avoid cholera and prevent its spread, observe the following precautions:

1. Boil all drinking water and place it while hot in covered vessels. Do not dip up the water when needed, but pour it into drinking cups, otherwise cholera germs may get into the water from the hands.

2. Do not touch drinking water or food with the hands unless they have just been washed in water that has been boiled.

3. Eat only cooked food. Avoid all fruits, raw vegetables, and raw fish. Dried fish may be made safe by thoroughly heating. Fruits may be made comparatively safe by dipping them a few seconds into boiling water.

4. Flies may carry cholera germs on their feet from human excreta to food; therefore, to protect it from flies, cover all food immediately after it is cooked.

5. If cholera appears, build smudges under houses to drive flies away.

6. Boil all water used for diluting milk.

7. Cook all meats and fish thoroughly so as to heat the same throughout.

8. Keep kitchen and table dishes thoroughly clean and scald them before using.

9. Keep the place in which you live, the ground under the house, and everything pertaining to it, clean.

10. Outhouses, closets, and vaults can be made safe by putting in lime or carbolic acid. When this cannot be done, dejecta must be buried or thoroughly covered with earth.

11. Isolate all the sick. It is recommended that a house in each barrio be set aside for this purpose.

12. All the dead should be embedded in lime and buried three feet under the surface.

13. Filth, or vomit, and the dejecta of the sick should be promptly cleaned up with boiling water and buried.

14. Clothes and bedding used by sick persons must either be burned or boiled. Do not wash any clothes near wells or springs nor permit surface water to run into any well or spring.

15. Municipal presidents and municipal councillors should enact these rules as ordinances and see that they are enforced.

16. All school children are requested to inform their parents of these rules, which, if observed, will prevent great loss of life.

The suppressive measures should consist in proper house quarantine which is difficult to maintain owing to the inefficiency of the average police to act as guards. Disinfection is important and should include the disinfection of individuals who have come in contact with the disease, with the contents of infected houses, of the houses themselves, and the disinfection of the premises, which may be done on a very large scale by using crude carbolic acid, potassium permanganate, or lime. The examination of stools should be made in suspected cases and cultures should be taken from suspects and contacts wherever the diagnosis is in question. These are made on culture tubes which are furnished from the central laboratory. Individuals who have been exposed to the disease are usually spoken of as contacts and should be under observation for at least five days after exposure.

THE USE OF THYMOL IN THE PROPHYLAXIS OF CHOLERA. Rosenel,¹ after experimenting with a number of different agents with a view to preventing the development of the cholera organism in the body, has come to the conclusion that thymol constitutes the most efficacious agent for this purpose, as it requires but a very minute quantity of thymic acid in the culture media to entirely arrest the development of the comma bacillus.

He administers the thymol in doses of 0.20 gram in keratinized capsules so that they pass through the stomach into the bowel. The feces from these patients have a definite odor of thymol, and a small quantity of the fecal material added to the peptonized bouillon prevented the growth of the cholera organism. As a result of these experiments, Rosenel suggested the use of this amount of thymol a day, taken on a fasting stomach, as a preventive of cholera.

Kussner has shown that a daily dose of even 1 gram of thymol is harmless, and Balz has been able to give as much as 7 grams a day without producing any symptoms of poisoning, so that it would seem that the method was at least harmless and deserving of a thorough trial.

TREATMENT OF CHOLERA. Rogers² has contributed an important article on this subject, and his results have been so striking that anyone interested in the subject should make a careful study of his methods.

In studying the loss of fluid from the blood, he found that in severe cases recovering after the use of injections of hypertonic saline solutions, one-half of the fluid had been lost, while in the most severe fatal cases no less than two-thirds of the fluid of the blood escaped. In other words, there was a very definite relationship between the amount of fluid lost and the nature of the attack. He also discovered that instead of the percentage of chlorides becoming increased with the concentration of the blood, it remained comparatively low, and in the worst cases was even below normal. This change accounts for the comparative failure of the injection of normal salt solution in cholera collapse, and has resulted in the *use of the hypertonic solution*, which consists of 120 grains of sodium chloride, 6 grains of potassium chloride, and 4 grains of calcium chloride to one pint of sterile water. During the eleven years preceding the use of hypertonic solutions, the death rate was 59 per cent. In 1906, when normal salines were used intravenously, it fell slightly to 51 per cent., and upon their being given up as of little value, it rose again to 59.5 per cent. The hypertonic solutions were commenced early in 1908, and during the two years of observations the mortality among 294 cases was only 32.6 per cent.

The solution can be made rapidly by the use of tablets, and this

¹ Vrach, 1909; La Semaine Médicale, February 9, 1910, p. 69.

² British Medical Journal, September 24, 1910, p. 835.

is injected intravenously. Three or four pints may be used in marked collapse, but should not be given more rapidly than 4 ounces per minute, and should be slowed at once to 1 ounce per minute if any distress or severe headache is caused. The specific gravity of the blood is a valuable guide; if it is raised to 1062 or over, the above quantities may safely be given. If it is not above normal, the collapse is probably not due to cholera, and such large injections might produce edema of the lung. If collapse occurs after the injection, it should be repeated. A marked rise of temperature may follow, and this may occasionally go on to hyperpyrexia. This occurs most commonly in patients whose regular temperature is above normal, although the surface of the body is cold. In such cases, the solutions should be given at just blood heat, or better, a little below.

Another important point in the treatment is the maintaining of the blood pressure, there being a very close relationship between a continued low-blood pressure and fatal uremia. From observations on a large number of cases, it was found that when the blood pressure remained continuously below 95 mm. the patient died, while if it was raised to over 105 mm. urine was almost invariably secreted. The measures used to increase the blood pressure include rectal, subcutaneous, and occasionally, intravenous injections of normal salt solutions, as well as the use of cardiac tonics, such as digitalis, strophanthin, and the vasoconstrictors, as adrenalin and pituitary extract.

The attempt to destroy the cholera germs in the bowel by the use of various antiseptics has not proved of any value, the reason probably being that the symptoms of the disease are due to the absorption of toxins. These toxins are very largely if not entirely intracellular, and are only set free after the death and disintegration of the spirilla. Rogers noted the somewhat similar action and nature of bacterial toxins and snake venoms, and was led to test the effects of oxidizing agents on the former. The permanganates, as is well known, possess remarkable power for destroying the toxicity of snake venoms. Rogers found that the toxins of the cholera spirillum were apparently destroyed in the same way, and has used permanganates both in solution and in pill form. Calcium permanganate was chosen as being less astringent, and, when used in solution, was started in strength of $\frac{1}{2}$ to 1 grain to the pint on account of the unpleasant astringent taste, the strength being rapidly increased up to 4 to 6 grains to a pint, or even stronger if the patient would swallow it. Vomiting sometimes occurs, but does no harm; on the contrary, obstinate vomiting is sometimes relieved by the use of permanganates. In pill form, 2 grains were given in a pill coated with salol and sandarach varnish. This allows the pill to pass through the stomach and be dissolved in the intestine.

The results of treatment are shown in the following table:

Period.	Treatment.	Cases.	Deaths.	Percentage.	
				Deaths.	Recoveries.
1895-1905	Rectal and subcutaneous salines . . .	1243	783	59.0	41.0
1906	Normal salines intravenously	112	57	51.9	49.1
1907	Rectal and subcutaneous salines . . .	158	94	59.5	40.5
1908-1909	Hypertonic intravenous salines . . .	294	96	32.6	67.4
Aug. 1909 to July, 1910	Hypertonics plus permanganates . . .	103	24	23.3	76.7

The results are best when used very early in the disease. Rogers does not claim this to be an infallible remedy, but he does believe that it is the best method that has yet been devised.

SERUM THERAPY IN CHOLERA. *Cholera at St. Petersburg.* The cholera epidemic at St. Petersburg in 1908 furnished certain points of interest. During the previous years the cholera approached the Russian border from India, and while it died out during the winter it returned again during the warm season. In St. Petersburg during the month of May, it was noticed that the number of deaths from gastro-intestinal diseases was above the average for the same period in other years, but it was not until August 26 that the cholera vibriion was isolated from an individual who died with a very severe acute enteritis. Once recognized and the alarm given, the number of cases of cholera became very numerous, amounting up into the thousands of new cases each week for several weeks and then there was a very rapid decrease in the number of cases. This decrease is particularly interesting because there was no isolation hospital for cholera in St. Petersburg, and cases were cared for in the wards of the various hospitals which had been cleared for the purpose. There was no organized effort for the disinfection of clothing or other fomites, and, as St. Petersburg has no sewers, the dejecta and water from the baths and the washing of the clothing was allowed to drain into the surface drainage canals. The diminution in cases was due probably to the individual effort to escape the infection. All of the houses were placarded with large notices concerning the importance of drinking only boiled water, and numerous stations were opened throughout the city for the free distribution of tea.

According to the official figures, the average mortality was about 45 per cent. About two-thirds of the cases were either classed as grave or very grave, while one-third of them were very light.

It is curious that, since the discovery of the cholera germ by Koch, comparatively little attention has been paid to this disease. Various theories as to the causation of the symptoms have been brought forward,

perhaps the most interesting one being that of Emmerich, who believed that the symptoms were caused by the formation in the intestine of nitrous acid. This opinion is apparently not true as the germ is exceedingly sensitive to the presence of even traces of acid, and symptoms and even death may be produced experimentally by the injection of the toxin from the vibron.

Salimbeni¹ visited St. Petersburg during the epidemic in order to test the curative value of the *anticholera serum* which had been prepared at l'Institut Pasteur in Paris by Roux, Metchnikoff, and Salimbeni. This serum was prepared from horses which had been immunized with the soluble cholera toxin and for the most part it was used only in the cases that were either severe or very severe. Cases were regarded as very severe if the pulse was over 135 or 140, or if the pulse was very weak or absent, even though there was comparatively slight cyanosis or alidity; while a slower pulse, 100 to 115, was an indication of more favorable prognosis, even with a certain amount of cyanosis.

The serum may be regarded as without danger and may be injected under the skin or into the veins. It is of little or no value in cases treated very late, but when it is given as soon as possible in severe cases it seems to have a decidedly favorable action.

It will, of course, take many more experiments to determine the value of this serum, but the initial results may be regarded as more or less satisfactory.

Common Colds. Walter² has made a study, covering a period of two years, of the bacterial flora of the mucous membranes of the nose when there were symptoms of rhinitis present. In the main his results were the same as those obtained by other observers, especially Benham and Allen, whose work was noted last year. He found that the *Bacillus septus*, which he calls the *Bacillus segmentosus*, or Cautley's bacillus, and the allied bacteria, which he groups under the heading of diphtheroids, are the most common causes of cold in the head, especially of the epidemic form. The *Micrococcus catarrhalis* is also found in quite a large number of the cases, and it was noted sometimes in epidemics of colds. The association of both of these organisms seems to increase their virulence. He did not find Friedländer's bacillus in acute colds, but found it in chronic inflammations of the nose, and believes it possible that it may be identical with the *ozena bacillus*. Allen, however, found that this organism was the cause of colds in some instances. The micrococcus of Fränkel is occasionally found in inflammatory conditions of the upper respiratory tract, and when it is pathogenic it may be found in pure cultures. The influenza bacillus was not found even once in 250 cases, which was very surprising in view of the fact that the diagnosis of la grippe colds is almost a daily occurrence, not only

¹ *Annales de l'Institut Pasteur*, January, 1910, p. 34.

² *Journal of the American Medical Association*, September 24, 1910, p. 1091.

by physicians in general practice, but by specialists. The absence of this organism may have been due to the fact that it grows poorly on blood serum unless some hemoglobin be present; if a different medium had been used, it might have shown its presence. Walter's findings however, coincide with those of other observers.

If the pneumococcus causes trouble apart from the nose, it is apt to involve the sinuses. The micrococcus catarrhalis is most apt of all to invade the larynx and trachea, and it may also gain entrance to the ear. The bacillus septus is most likely to be found in the nose, and it may be a cause of otitis media, but it seldom affects either the trachea or larynx. The bacterial flora of the nose in America apparently does not differ much from that found in other countries.

The Treatment of the Cysticercus by Male Fern. About a year ago Renzi announced the good effects of the treatment of two cases of echinococcus by the use of an ethereal extract of male fern. One was a case of echinococcus of the liver and the other of the brain.

More recently Dianoux,¹ professor of ophthalmology in the medical school at Nantes, had a remarkable instance of cure in a case of cysticercus of the vitreous body. The patient was a man, aged thirty-one years, who for some months had had epileptiform attacks characterized by headache, followed by loss of consciousness, movements of the arm and of the head. At the same time that these attacks began, the patient suffered with progressive lessening of vision in the left eye. There were no changes apparent, but with the ophthalmoscope it was possible to make out a small vesicle on the temporal side which was of a pearly gray color with orange-yellow borders. In the centre the cysticercus could be made out, and its movements noted. Later, a nodule about the size of a pea developed in the skin of the right thigh. Following the administration of a vermifuge a *tænia solium* was expelled. The patient was given the ethereal extract of male fern in capsule, each containing 0.5 gram, three or four of these being given in a day. The good eye was carefully watched during this period for any evidence of optic neuritis. Under the influence of this medication, in about fifteen days certain modifications in the appearance of the cysticercus in the eye were noted. The edges were less distinct, the vesicle became flatter and smaller, and the movements in the vesicle ceased. The treatment was continued over a period of seventy-one days with interruptions, 102 grams of the extract of male fern being taken in all. At the end of this time the vesicle had entirely disappeared, and there remained only a small cicatricial spot on the retina with a slight increase of the vessels at that point. The cysticercus in the skin had disappeared, and the symptoms noted above, which suggested a cysticercus of the brain, had also disappeared. The disappearance of the cysticercus

¹ La Semaine Médicale, December 15, 1909, p. 595.

in the space of seven weeks is very remarkable and points to the specific action of the male fern in this case. Spontaneous cures have been reported, but, as a rule, they have covered a very much longer space of time. In future, in the treatment of the cysticercus, when not amenable to surgical interference, it would seem that the use of male fern could be recommended, especially to determine its true value in these cases.

Delhi Sore. Following up his brilliant work on infantile kala-azar, Nicolle,¹ in connection with a collaborator, Manceaux, has made a careful study of the Delhi sore, known under various names, such as Bouton d'Orient, Clou de Biskra, d'Alep, du Nil, etc. This disease, which is found throughout the East and northern Africa, has been found to be due to a parasite which has been called *Leishmania tropica*, and this apparently differs no way from the *L. infantum* which has been found in the infantile kala-azar, the only difference in cultures being that the former is apparently more active and grows more rapidly. Cultures are easily made and grow rapidly at 22° C., and live in this temperature about two months, but not longer. Inoculations on suitable media may be made indefinitely.

The human virus of the Delhi sore is pathogenic for man and various monkeys. Atypical lesions may be produced either in man or monkey by inoculations with cultures, and typical lesions may be produced in dogs with cultures of canine origin. The incubation period varies from sixteen to one hundred and sixty-six days; it is generally long, and during this time nothing can be noted; then there appears at the site of the inoculation a hard papule, sometimes sensitive, which becomes violet-red. This may disappear, or it may rupture spontaneously or after scratching, and it then exudes a liquid, sometimes clear and sometimes colored, which forms yellowish crusts. The liquid from this ulcerative surface is rich in parasites.

Nicolle has studied the subject of immunity, but without producing any very practical results.

Diphtheria. DIPHTHERIA IN YOUNG INFANTS. Rolleston² has reported an interesting case of malignant diphtheria with multiple lesions in a bottle-fed child, aged six weeks. When first seen the child had a membrane upon the anterior pillars of the fauces, tonsils, and uvula. The membrane was also present in the nose, in the mouth, on the labia majora, and on the skin around the anus. From all these lesions the diphtheria bacillus was cultivated. In spite of large doses of antitoxin, the child died. The temperature was never above 98° during the time the child was in the hospital.

It is interesting to have such a report in so young an infant, as the number of very young infants that contract diphtheria is comparatively

¹ Annales de l'Institut Pasteur, September, 1910, p. 673.

² Lancet, September 24, 1910, p. 947.

small. The reason for this has been ascribed to various causes, such as immunity acquired in utero (Ehrlich), antitoxin transmitted through the mother's milk (Schmidt and Pflanz), the acid reaction of the infant's mouth which does not favor the growth of diphtheria bacilli (Monti), and the relative isolation of children during the early months of life (Jacobi).

The mortality in the very young is very high, due chiefly to the low resistance and the tendency to develop bronchopneumonia. Another factor which should be considered is the fact that the diagnosis is often not made until it is too late to use antitoxin to advantage.

Rolleston was able to collect 11 sporadic cases of faucial diphtheria occurring in the last ten years. These were in sucklings whose ages ranged from four days to eight weeks. With antitoxin treatment, 9 recovered and 2 died. In 8 cases, the mother or some other member of the family had recently had diphtheria. Epidemics in sucklings have been reported a number of times. In one epidemic reported by Riether, 22 of the 31 infants were under two months of age. All but 9, in whom the disease was purely nasal, had both faucial and nasal diphtheria. Most of the cases occurred in children who were naturally feeble or exhausted by previous illness.

PRIMARY DIPHTHERIA OF THE EXTERNAL URINARY MEATUS. Howell¹ has reported an unusual instance of a primary diphtheritic infection in a girl, aged nine years. Attention was drawn to the condition by the presence of a little blood on the child's underclothing. Upon examination, the urethra and the tissues about it were found to be swollen and dark purple in color. There were several small punched-out ulcers present, and the whole of the affected surface exuded a thin blood-stained discharge, but there was nothing suggesting a false membrane. The inguinal glands were not enlarged. The swelling was tender to the touch, although there was no pain on urination. The temperature was normal, and the child's general condition very good. After four days of rest and local applications the condition had somewhat increased, and, owing to the lack of sensitiveness, a culture was taken and it was found to be diphtheria. Antitoxin was administered, and the lesion healed promptly. The principal interest attached to the diagnosis is that the presence of unusual-looking swellings and ulcerations, attended with but little tenderness or pain, should always arouse suspicion of diphtheria.

THE BUNDLE OF HIS IN DIPHTHERIA. Amenomiya² has made a study of the heart in some fatal cases of diphtheria, and found that in some instances in which there was fatty degeneration of the heart muscle, the bundle of His was also affected, and this may be one of the causes of paralysis of the heart coming on in the course of this disease.

¹ Practitioner, November, 1910, p. 724.

² Virchow's Archiv, 1910, vol. ccii, p. 107, No. 1.

It must, of course, be borne in mind that other changes in the heart may account for many of the cases observed clinically.

DIPHTHERIA CARRIERS IN THE PUBLIC SCHOOLS. The interest in diphtheria carriers, especially in their relation to disease in the public schools, still continues, and we may eventually hope to have very definite information upon this subject. One of the most enlightening articles is the contribution by Slack, Arms, Wade, and Blanchard.¹

Two types of the organisms are met with, which have essentially the same morphology. One is virulent, and the other is non-virulent. When the virulent organism is associated with a susceptible individual, the disease is usually easily recognized, and steps may be taken to isolate the case; but probably of even greater danger to the community are the individuals who are immune and who harbor the virulent organisms in their mouths or throats. A certain proportion, about 1 per cent., of all people have non-virulent organisms in their mouths which have the same morphological characters as the virulent organism.

A very careful study was made by the above observers in the Brighton district in Boston. Cultures of all the children were taken several times, and those children showing diphtheria organisms were kept from school until their throats were again clear. Without going into the details of the investigation, conclusions may be drawn which are of great interest.

First, at least 1 per cent. of all healthy school children are carriers of morphologically typical diphtheria bacilli; that such bacilli are capable of passing from one such person to another, and the condition is usually a transient one; that these organisms ordinarily have little or no virulence, while it is possible that by passing through a susceptible individual their virulence might be raised to cause the disease, but this does not occur often.

They are of the opinion that the disease is kept alive in the community by virulent organisms in immune persons, and that, where an outbreak of the disease occurs, all contacts should be tested by means of cultures and all those showing positive cultures should be isolated. Where the disease is not present, the isolation of individuals who are carriers of probably non-virulent bacilli is of no proved benefit, and it is a costly and laborious procedure entailing much unnecessary hardship upon innocent and probably harmless parties. They are also of the opinion that the attempt to control diphtheria in a city by a round of cultures from all school children at the beginning of the school year does not seem encouraging from the results of their experience, and that the proposition to stamp diphtheria out of a city by cultural tests of all inhabitants and isolation of all carriers is impossible from any practical standpoint.

¹ Journal of the American Medical Association, March 10, 1910, p. 951.

DIPHTHERIA ANTITOXIN. An interesting discussion on the subject of diphtheria antitoxin took place in the Hamburg Medical Society,¹ the discussion having been called forth by a severe epidemic in which a large number of adults were attacked with intense symptoms, a high death rate, and marked tendency to relapse.

Rumpel, the hospital physician, is of the opinion that unexceptional statistical evidence of the absolute efficiency of antitoxin has not yet been produced. He presented a compilation of the percentage death rates in diphtheria since 1880. The first curve represented the mortality rate of the Eppendorf hospital, in which, since 1894, nearly all, and, since 1899, all of the patients have been injected. The second curve showed the city apart from the hospital, in which antitoxin was given later and only partially. The third, that of the country district, in which antitoxin was used later and less frequently. All three curves showed an identical sharp fall in 1894, and a renewed rise at the present time. Rumpel admits the temporary favorable influence of the serum on the local process.

Lenhartz took a decided stand against this opinion, and so did a number of other physicians. This discussion demonstrates a very healthy spirit of criticism in regard to therapeutic measures.

It would seem strange that a physician who had had a large experience with antitoxin, and with what might be regarded as favorable results, would lose faith in its efficiency in lowering the mortality on account of an epidemic in which the death rate was lower than in previous epidemics of the same general character.

This discussion was really productive of good, as the Medical Board of Hamburg has made an appropriation to furnish diphtheria antitoxin free to patients not able to pay for it, and have made arrangements to simplify the bacteriological diagnosis by means of the distribution of culture tubes.

Anderson² has made a study of *the influence which age and temperature have upon the potency of antidiphtheritic serum, and also of antitoxic globulin solution*. The study was undertaken in order to determine whether the method used by most manufacturers of timing the serum to be returned or exchanged for fresh antitoxin was a sufficient safeguard or not. It is the custom of most manufacturers to place the date from nine to twelve months after it is placed upon the market, while some have extended this period to eighteen months or even two years.

Anderson concluded that the average yearly loss of diphtheria antitoxin of room temperature is about 20 per cent. If the antitoxin is kept at 15° C. the loss is about 10 per cent. a year, and at 5° C. it is about 6 per cent. In some instances these percentages may be largely

¹ Journal of the American Medical Association, March 19, 1910, p. 981.

² Journal of Infectious Diseases, May 20, 1910, p. 481.

increased. There is apparently very little difference in the keeping qualities of the ordinary untreated sera and the sera concentrated by the Gibson process.

Anderson is of the opinion that diphtheria antitoxin placed upon the market and kept there under unknown conditions as regards temperature should not be labelled with return date longer than two years, and should contain an excess of at least 33 per cent. to allow a decrease in potency. He also believes that, when the serum is sold in syringes with absorbable pistons, an excess should be added to make up for this loss. The dry diphtheria antitoxin kept in the dark at 5° C. retains its potency practically unimpaired for at least five and one-half years.

Anderson emphasizes two points upon which physicians seem to need enlightening, although they are perfectly clear. One is that the protective value of the diphtheria antitoxin is in exact accord with its unit value and is quite independent of the bulk or other properties of the serum, and that old serum is just as efficacious therapeutically if one takes into account the number of units that it actually contains. The aging, while it leads to a lessening of the number of units in any particular package, does not otherwise affect the serum, and, if a sufficient quantity be given, results will be obtained.

THE DIFFUSION OF DIPHTHERIA TOXIN IN THE BODY. Connio¹ has experimented with diphtheritic toxin, injecting it into animals and after their death washing the fragments of the various organs with salt solution to cleanse them from the blood serum as thoroughly as possible, and then injecting these into guinea-pigs. He found that the toxin was fixed in the adrenals, and, if large doses were given, in the brain. The spinal cord and peripheral nerves, however, contrary to the experience in tetanus, show but little power to fix the diphtheritic toxin. The other organs, liver, spleen, and kidney, as a rule, had no power of fixing the toxin.

A SIMPLIFIED METHOD OF STAINING FOR DIPHTHERIA BACILLI. Since Neisser first described his method of staining the diphtheria bacillus, numerous modifications and procedures have been suggested, and one of the most recent is the method of Sommerfeld,² which, on account of its simplicity, should prove a valuable method in clinical work. It may be used in staining smears from cultures, or direct from the throat. The fluid is first stained with a methylene blue solution—either Loeffler's or the ordinary alcoholic or water solutions. The preparation is then washed off or dried with blotting paper, and a solution of equal parts of formalin (45 per cent. formaldehyde) and alcohol, or the formalin solution without the alcohol, is added. This is left on until the preparation is almost entirely decolorized; the prepa-

¹ *Annales dell' Istituto Maragliano*, 1909.

² *Deutsche medicinische Wochenschrift*, March 17, 1910, p. 505.

ration is then washed with water and dried. The polar ends of the bacillus are stained dark blue, while the remainder is a very light blue.

CUTANEOUS ANAPHYLACTIC REACTION AS A CONTRAINDICATION TO THE ADMINISTRATION OF ANTITOXIN. Following the work of Knox, Moss, and Brown,¹ Moss² has suggested the use of a cutaneous reaction to determine whether or not serious results are liable to follow injections of antitoxin.

Knox, Moss, and Brown described a local cutaneous anaphylactic reaction which indicates hypersensitiveness to horse serum in rabbits. Its application to human beings is a matter which Moss suggests, and it will have to be worked out in various clinics where there is sufficient material at hand to determine its value. Its simplicity ought to lead to a thorough trial of it on human beings.

Moss studied 30 cases, the test being made as follows: The skin of the non-hairy inner side of the upper arm is cleansed and 0.01 c.c. of normal horse serum, preserved with a few drops of chloroform, is injected intradermally. It is convenient to use a syringe divided into hundredths of a cubic centimeter, and the undiluted serum should be employed.

A positive reaction usually consists in an area of inflammation, 1 to 2 cm. in diameter, which comes on within twenty-four hours and disappears in from two to three days. It may disappear within twenty-four hours, and an observation should be made about ten hours after the injection in order not to miss it. There are no constitutional disturbances.

If the reaction is negative there is only the needle prick, and if the needle has been introduced sufficiently superficially, this may not be noted.

Of the 30 individuals tested, 9 had never received any form of antitoxin, and all 9 gave a negative reaction. The other 21 had received antitoxin from four months to ten years previously; 10 of these gave positive reactions, and 11 negative.

There seems to be no relation between the length of time which has elapsed between the time the antitoxin has been given and the reaction. In 3, the reaction came on with great suddenness and intensity.

The value of this dose can only be determined by using therapeutic or prophylactic doses of antitoxin in individuals who give the positive skin reaction, and these will be cases in which the necessity for the use of antitoxin is sufficiently urgent to counterbalance any result from anaphylactic manifestations.

Anyone who has had any large experience with antitoxin has noted, more or less frequently, the various anaphylactic phenomena—the

¹ Journal of Experimental Medicine, 1910, p. 562.

² Journal of the American Medical Association, August 27, 1910.

more common light forms being erythema, joint pains, urticaria, and slight fever; the more severe including albuminuria and bloody stools. The more serious forms are fortunately not of very common occurrence, and I am of the opinion that the widespread prominence which has been given anaphylaxis in recent years has deterred many physicians from the prompt use of antitoxin. The enormous reduction in suffering and death which has resulted from the use of antitoxin entirely overbalance the occasional inconvenience which may result from its use. If Moss' reaction, however, proves to be of value, it would be useful particularly in preventing the use of antitoxin as a prophylactic in individuals who are hypersensitive to serum.

INTRAVENOUS AND INTRAMUSCULAR INJECTIONS OF DIPHTHERIA ANTITOXIN. Berlin¹ has called attention to the results which he has obtained by the use of large doses of diphtheria antitoxin. He found that he was able to secure more rapid and more favorable results by injecting these doses either directly into the veins or into the muscles. Up to the present time, in using the ordinary serum to which small amounts of carbolic acid have been added, he has noted no disastrous effects from this method of using the antitoxin. This is a point which might be of considerable interest in the treatment of unusually severe cases of diphtheria which do not react to ordinary doses of antitoxin. It might also be applied to the treatment of cases in which no favorable reaction follows the subcutaneous injections of antitoxin.

THE EFFECT OF DIPHTHERIA ANTITOXIN ON MENSTRUATION. Collier² has called attention to a fact which has not been described before, that in the nurses in the Steel Memorial Hospital the repeated administration of even small doses of antitoxin caused in many cases a profuse clotted menstrual flow, which amounted in some cases to hemorrhage. It would be interesting to know the results in other hospitals where the systematic and repeated immunization by means of injections of diphtheria antitoxin is used.

Amebic Dysentery. Gage³ has reported a case of unusual interest in which there was infection with the ameba, with the uncinaria, the trichocephalus, and trichomonads. The patient was admitted to the hospital on account of chronic diarrhea, with blood and mucus in the stools. This had existed for four years. The uncinariasis was of a mild type, there being no distinct anemia, and the eosinophiles were not marked. Ashford and King's treatment was used: Epsom salt, 1 ounce, at 6 A.M.; no breakfast; thymol, 30 grains in capsules at 7 A.M.; thymol, 30 grains at 8 A.M.; Epsom salt, 1 ounce, at 11 A.M. This treatment was successful. The trichomonads were not greatly affected by it. The trichocephalus eggs were found only on one occa-

¹ Deutsche medicinische Wochenschrift, February 3, 1910.

² Journal of the American Medical Association, May 1, 1910, p. 1518.

³ New York Medical Journal, December 4, 1909.

sion. The dysentery was treated by the administration of ipecac: Seven-gram boluses, in $\frac{1}{2}$ -gram bolus pills coated with salol, were given at intervals of one-half hour, beginning at 9.30 A.M. Quinine irrigations were also used. The ipecac did not cause any great amount of nausea. In a case of long standing, such as this, which one would consider as a fit case for surgical treatment, the results of this ipecac treatment are very interesting, and a thorough trial should be given this time-honored remedy before it is discarded, especially in the light of the following observation.

IPECAC IN THE TREATMENT OF INTESTINAL AMEBIASIS. Bram and Zeiler¹ have contributed an important article dealing with the treatment of amebic infections. After four years of experience in attempting to eradicate the ameba from the intestine by means of rest, dieting, and lavage of the colon, they came to the conclusion that none of these methods was effective. Enemas of various solutions were used, such as quinine, thymol, and quinine and thymol combined. They have apparently cured 14 patients with amebic infections by the use of ipecac; 8 with dysentery followed six weeks to five and one-half months after repeated examinations for amebæ; 3 with dysentery followed less than six weeks; and 3 without dysentery followed two to five months. In 4 other cases they failed to eradicate the infection, but these cases were not thoroughly treated.

In their administration of large doses of ipecac in salol-coated pills, the thickness of the salol coat must be carefully regulated so as to prevent vomiting on the one hand, and the passage of intact pills through the intestinal canal on the other. They consider the best initial dose to be 60 or 80 grains at one time, and decrease the dose 5 grains daily until a dose of 10 grains is reached, although rapid cures may sometimes be effected by giving 40 grains three times during the twenty-four hours. During the treatment the patient should be at rest in bed, and on a liquid diet. No solid food or milk should be given for at least six hours previous to the ipecac, and no liquids for three hours previous. No opiate is necessary. They consider this the best treatment so far devised, and recommend that a thorough trial be given it before attempting surgical procedures.

THE PREVALENCE AND TREATMENT OF AMEBIC DYSENTERY. Nydegger² has called attention to the widespread *prevalence* of amebic dysentery in the United States and in other northern countries, and emphasizes the fact that it is not necessary for the patient to have been in the tropics in order to contract it.

The first studies of this disease in America by Osler, Councilman, and Le Fleur, in 1890, were largely done on cases originating in Maryland,

¹ American Journal of the Medical Sciences, November, 1910.

² Pennsylvania Medical Journal, May, 1910, p. 633.

and Nydegger has found the disease in an isolated mountainous section of West Virginia.

Amebæ have also been found associated with pellagra by Allen and others, this latter observer stating that at times the symptoms of pellagra and amebiasis are so much alike that it is often very difficult to tell with which disease one is dealing. As noted elsewhere, some observers believe that the ameba is the cause of pellagra.

Just a word may be added on the *treatment* which, in the acute cases, should consist of cleansing saline rectal injections, and later, quinine solution in the strength of from 1 to 5000 to 1 to 1000. In the chronic cases the best results seem to have been obtained by appendicostomy, by which means the large intestine may be thoroughly washed out with little difficulty. The fistula thus formed is comparatively inoffensive, and in most cases will close spontaneously. Operative treatment is, however, best deferred until there has been a thorough trial of the ipecac treatment as outlined above.

Echinococcus Disease. THE SERUM DIAGNOSIS OF THE ECHINOCOCCUS. Dobrotin¹ has confirmed the results of Weinberg and others in regard to the diagnosis of an echinococcus cyst by means of the complement-deviation test, as described in PROGRESSIVE MEDICINE for March, 1909, page 134.

The cases reported up to date have been cases of unilocular cysts. The case of Dobrotin was a multilocular cyst, which is, I believe, the first report in the literature where this method of diagnosis has been employed. The reaction was positive, and the antigen used was the fluid from patients suffering with the unilocular cyst.

The multilocular cysts are comparatively infrequent, and up to 1909 there were only about 250 cases reported in the literature, of which about 90 occurred in Russia, and about 30 of these were reported from Kasan, where Dobrotin is a professor in the University.

Filaria. Numerous methods of treating *Filaria* hematohyluria have been suggested, and among the most satisfactory results are those obtained by Wary and McDill, by thorough cinchonization and subsequent exposure to the x -rays. Wellmann and von Adelung² have recently used this method with success. Thymol and methylene blue have been successful in the hands of some, and unsuccessful with others. The method of treatment was by the administration of quinine in large quantities; divided doses being given daily, and exposures to the x -rays once a week, the exposure varying from one-half minute to a minute and a quarter.

Of course, two cases are entirely too few to base any conclusions upon, but this method of treatment ought to be tried by others having cases, to determine its real value.

¹ Berliner klinische Wochenschrift, July 11, 1910, p. 1315.

² Journal of the American Medical Association, April 23, 1910, p. 1368.

THE RELATION OF MOSQUITOES TO FILARIASIS. Wellmann, von Adelung, and Eastman¹ have made a careful study of two of the varieties of culex mosquitoes most commonly found in the region of the San Francisco Bay. They allowed these mosquitoes to bite a patient suffering with filarial infection and afterward made a careful study of the bodies of the mosquitoes. They conclude that these two species of culex mosquitoes are not efficient hosts at room temperature for the nocturnal filaria.

The Virulence of Old Cultures of the Glanders Bacillus. There is a prevalent idea that old cultures of the bacillus mallei lose their virulence in a very short time, and while this is probably true in many cultures, it has been shown by Arms² that the organism may live in glycerin broth and retain its virulence for at least two months, even if kept at the body temperature. The cultures grown on potato may be virulent for a month's time, and the virulence of the organism is retained in spite of its having been transplanted a number of times. The importance of this observation is chiefly from the standpoint of protecting laboratory workers who frequently regard older cultures of the glanders bacillus as harmless, and take no special precaution to avoid accidental inoculation.

Hookworm Disease. Considerable interest has been shown in the hookworm disease as is evidenced by the holding of the first Southern Health Conference in Georgia, January 18 and 19, 1910, at which meeting the various phases of the disease were discussed by authorities.³

A rather complete and sufficiently popular account of this disease has been given in the excellent publication by Dock and Bass.⁴

The problem of the hookworm is a very great one, and it seems probably one that will be finally solved, inasmuch as it is intimately associated with power of production in the people affected, and the curing of the hookworm disease would probably have a greater commercial value than almost any other disease which one could mention.

Lack of space prevents a full discussion of this interesting disease. The symptoms may be practically wanting in latent cases, but a latent case may act as a carrier, and may at any time develop into a mild case, and eventually into a case of moderate severity or become severe.

In the mild cases there is a sallow skin, variations in the skin, digestion, and the action of the bowels. There is sometimes pain in the abdomen, the muscles are soft, flabby, and easily fatigued, and hence the patient is not disposed to exert himself. There is also a mental dulness. There is sometimes dyspnea, palpitation of the heart, and other symptoms.

In the moderately severe cases, there is distinct pallor and marked disturbance of the digestion. There are frequent perversions of the

¹ Journal of the American Medical Association, July 16, 1910, p. 217.

² Ibid., February 26, 1910, p. 699.

³ Ibid., 1910, pp. 394, 484, and 644.

⁴ The Hookworm Disease, St. Louis, 1910.

appetite, the patients eating dirt and other inedible objects. Nausea is a frequent symptom, and vomiting may occur. There is usually tenderness in the abdomen. There is frequently disturbance of circulation and respiration, weak pulse, and often dropsy.

In the severe cases, there is very pronounced anemia and weakness, much greater disturbance of digestion, all the other symptoms are more marked, and there is impotence in the men and amenorrhea in the women.

When the disease occurs in children, it causes a remarkable lack of development, so that individuals twenty to twenty-five years of age, may resemble children of from twelve to fourteen. After the disease is cured, the growth usually starts, unless the symptoms of infantilism have persisted for a very long time.

Treatment. This is very simple. On the day previous to the medication, the patient is advised to eat a small dinner and no supper, and late in the afternoon should be given a full dose of calomel, from 2 to 10 grains, according to the age and strength of the patient. If this does not produce free purgation, a full dose of Epsom salt should be administered the first thing in the morning. Finely powdered thymol in capsules is then administered, the dose being varied according to the apparent age of the individual. The first half of the thymol is given at once, and the second at the expiration of an hour. The patient should remain in bed and lie on the right side, so that the drug will pass as quickly as possible from the stomach into the intestine.

Harris suggests the following doses: Up to five years from 7 to 10 grains; from five to ten years, 10 to 20 grains; from ten to fifteen years, 20 to 40 grains; fifteen years and over, 40 to 60 grains. In advanced life, when the patient is weak, the smaller quantities should be used.

On the day of the treatment no breakfast and no dinner should be given, although a cup of coffee may be taken once or twice, if desired. About four or five o'clock in the afternoon another saline is administered, and after the bowels have been freely moved, the patient may be allowed food. When this method of treatment of the disease is used, it is almost invariably successful.

Beta-naphthol may be substituted for thymol, if desired. It is well to caution the patient against the use of castor oil as a purgative, as the oil renders the thymol more freely soluble, and, if given, may cause the appearance of symptoms of poisoning.

HOOKWORM FEVER. Castellani¹ has called attention to the fact that, in patients infected with the uncinaria, fever is of not infrequent occurrence, the commonest type being low, intermittent fever with a temperature above normal late in the morning and evening, and falling lowest at night between 11 P.M. and 2 A.M. The temperature, as a rule, does

¹ Journal of Tropical Medicine, September 1, 1910, p. 255.

not exceed 101° F. Other forms of irregular fever, and also the undulating type somewhat similar to that seen in Malta fever have also been observed. The origin of the fever is not quite clear, but it would seem that in some cases it is probably due to secondary infection brought about by intestinal bacteria. There is not much difference between the aerobic bacterial flora of these patients and that of normal individuals.

INFANTILISM IN HOOKWORM DISEASE. Lemann¹ has made a study of the infantilism which accompanies hookworm infection in young individuals. In some instances, the condition is very marked, causing the patient to look as much as half his true age. It has much in common with infantilism seen from other causes, but is quite distinct from such dwarfism as occurs in achondroplasia, Mongolism, and rickets. There is a general retardation of growth, which is usually symmetrical and harmonious, and the changes in the skeleton consist of a retardation. There is a failure of development of the genitalia and absence of secondary sexual characteristics. There is usually, though not always, a mental slowness and dulness. Very similar conditions may be brought about by chronic malaria and pellagra, as well as by intestinal infections in early life.

Influenzal Meningitis. Hymanson² has reported two cases of influenzal meningitis and called attention to the reports of this condition in medical literature. The fact that meningitis can complicate influenza has been known for a long time; it was noted during the epidemics of 1848 and 1849, but, of course, at that time it was impossible to differentiate between the different forms of meningitis.

Following Pfeiffer's discovery of the bacillus of influenza in 1892, this form of infection has been studied more carefully, and Fraenkel and others have described cases of meningitis due to Pfeiffer's bacillus. Since then the diagnosis of the disease has been made by means of lumbar puncture, Shlawik, in 1898, being the first to report a case in which the diagnosis was made by the use of the puncture. Since then the disease has been reported in various countries—by Mya, in Italy, and Douglas, in London. Adams has reported a number of cases in this country.

The Influenza Bacillus in Cholecystitis. Knina³ reported a case of cholecystitis in a patient aged fifty-five years. In the pus found at operation the only organism present was the bacillus of influenza. It is exceedingly rare to find a pure culture of the influenza bacillus in the gall-bladder, although there are several such cases on record in the literature, and the usual cases of empyema of the gall-bladder present numerous germs of different kinds. The difficulty in making the

¹ Archives of Internal Medicine, August, 1910, p. 139.

² New York Medical Journal, December 25, 1909, p. 1268.

³ Wiener klinische Wochenschrift, September 9, 1909.

diagnosis in the case of the Pfeiffer bacillus may account for the extreme rarity with which it is found.

Influenzal Arthritis. Ghedini¹ has reported an instance in which there was swelling and pain observed in the various joints, which changed from one to another, and finally subsided at the end of a month. Blood cultures showed the presence of the influenza bacillus, which was probably responsible for the infection in the joints.

Leprosy. THE CULTIVATION OF THE LEPROSY BACILLUS. Duvall² has succeeded in growing an acid-fast bacillus which he isolated from human tissues in four cases of leprosy. This bacillus corresponds closely to the bacilli found in the human leprous tubercles.

Clegg was the first to demonstrate the possibility of growing the leprosy bacillus outside the human body, and Duvall has confirmed the fact by growing it in the presence of amebæ, and he has also succeeded in reproducing the disease in the Japanese dancing mouse, thereby establishing its identity. This species of animal acquires the infection in from four to six weeks after intraperitoneal or subcutaneous inoculation with either emulsion of fresh leprous tissue or the pure cultures of the lepra bacillus.

The lepra bacillus will grow upon agar seeded with pure culture of encysted amebæ and on certain other special media. To prove that the cultures obtained from the human tissues are lepra bacilli and not some other acid-fast species, Duvall offers the following facts: (1) The growth features are distinctive, and multiplication takes place only under special conditions of temperature and medium. (2) The complete correspondence in tinctorial properties, and similarity in morphology to those in the tissues. (3) The failure to multiply or to produce lesions in the common laboratory animals. (4) The growth of the bacilli and the production of leprous lesions in the Japanese dancing mouse.

THE DIAGNOSIS OF LEPROSY. Dyer and Hopkins³ have called attention to the fact that cases of leprosy find their way into the United States apparently with little difficulty, the disease either not being recognized by the quarantine physicians, or no attention being paid to it, in spite of the fact that there are special immigration laws which require the deportation of lepers.

Their paper deals with the diagnosis of the disease, some few points of which may be noted here. The chief trouble in diagnosis is with the atypical cases, incipient tuberculous cases, and those anesthetic cases in which there are no longer active skin lesions. The changes which occur in the lesions during the periodic lepra fever may also

¹ Gazzetta degli Ospedali e delle Cliniche, Milan, August 18, 1910, p. 1041.

² Journal of Experimental Medicine, September, 1910, p. 649.

³ Journal of the American Medical Association, September 10, 1910, p. 909.

lead to mistakes in diagnosis. Some of the cases are anesthetic or trophic, in which case the nerves are injured by the presence of the bacilli, while in the tuberculous or nodular cases the lesions are caused by the presence of the bacilli in the skin. There may be mixed cases in which both forms are present, and sometimes the character of the disease changes, so that what was a tuberculous type may become an anesthetic one, or *vice versa*. One of the difficulties in recognizing the skin lesion is that the macular eruptions do not always present the same appearance. Of course, the typical brown-stained surface which is anesthetic is very easy to recognize, but at times the pigment may be irregularly distributed, or there may be more or less inflammatory changes present which lead to mistakes. Bullous eruptions are sometimes seen, although they are rare. The late cases should present no special difficulties, as the destructive, trophic changes should always suggest the disease. The tubercles are found usually upon the face, especially on the exposed portions, the lower part of the forehead, ears, nose, chin, and the cheeks, the frequency being in the order named. Later on, the typical leonine expression is present. The ears should always be examined, as they almost invariably present nodules.

There are two types of *ulcers*, one which is perforating and destructive; the other, superficial. The presence of anesthesia should always be borne in mind, and the fact that the pain and temperature sense are lost before the sense of touch should be remembered. The ulnar nerves are usually first involved, and sensibility is lost first in the tip of the little finger, and gradually spreads to the other surface supplied by the ulnar nerves. Any patient whose skin presents a dusky hue and is swollen, whose voice is hoarse, with the epidermis of the hands altered in color, or has the presence of nodules on the face or ears, should excite suspicion.

The tuberculous leprosy is most liable to be confused with *iodism* in which the nodules are more inflamed and ready to break down, and with *tuberculosis of the skin*, in which the lesions are numerous, small, and deep seated, usually under the epidermis.

During the course of leprosy there are periodical outbreaks of *fever*, which may be very slight or which may go as high as 104° F., and during these periods of fever there are changes in appearance of the skin lesions, the tubercles taking on evidences of inflammation, becoming reddish in color. Sometimes the fever may apparently be due to changes in lesions in other parts of the body and the skin may remain unaffected.

Malaria. RECENT RESEARCHES IN MALARIA. There has been considerable work done by various observers on the plasmodium of malaria, and this has given rise to a number of new terms and certain new conceptions which relate to the epidemiology and the prophylaxis of malaria.

Craig¹ has given an account of his own observations, together with a résumé of our present knowledge of the subject. His account includes the exact *methods for differentiating various forms of the different varieties of malarial plasmodia* which cannot be gone into fully at this time, but to which the reader is referred for detailed information.

Recent researches have shown that there are several different *forms*. What are regarded as the males are known as microgametocytes, and the females as macrogametes. No true development of these bodies occurs in man, but, if the blood containing them be removed from the body, the microgametocytes frequently undergo flagellation and produce free, motile, filamentous forms, known as microgametes. In the middle of the intestine of the mosquito the microgametes penetrate, the macrogametes representing the process of fertilization.

The *organism of tertian malaria*, the *plasmodium vivax*, is most frequently met with in America, and the different forms may usually be differentiated in the stained blood specimens without much difficulty, the macrogamete being slightly larger, circular in shape, and the pigment is arranged in forms of large grains about the periphery of the organism or in a wreath-like form at some distance from the periphery. The microgametocyte is slightly smaller and the pigment is distributed generally throughout the protoplasm. The microgametes are thin thread-like hyaline bodies with a serpentine motion, occasionally containing a few pigment granules, but this pigment is always cast off after a very short time. These should not be mistaken for the flagella of the microgametocyte.

Craig has gone into detail in the differentiation of the stained specimens as well, which need not concern us at this time. In a general way the forms of the plasmodium malariae, the organism of the quartan type of the disease, resemble those described above, with the usual well-known differences with regard to the general appearance of the organism. The *estivo-autumnal plasmodia*, the *plasmodium falciparum*, and the *plasmodium falciparum quotidianum* differ considerably from the above in that the sexual forms are commonly known as crescents, and are very easily differentiated from the other forms. The macrogametes are more opaque and granular in appearance, the pigment is dark brown in character, and is arranged in a wreath-like manner near the centre of the organism. The crescent measures 11 to 15 μ in length and 3 to 5 μ in breadth, that of the quotidianum form being slightly smaller. Preparatory to fertilization, the crescentic form is lost, the organism becomes oval and then circular, and the pigment is divided into small clumps arranged in a circle about the centre of the parasite. This change is seen in the intestine of the mosquito, but is occasionally noted in blood withdrawn from the human body. The microgameto-

¹ The Sexual Forms of the Malarial Plasmodia Occurring in the Blood of Man, Archives of Internal Medicine, April 15, 1910, p. 325.

cytes are somewhat smaller and are kidney-shaped rather than crescentic, and the pigment is generally distributed in fine particles, or sometimes collected at one pole of the crescent.

The microgametes resemble those of the other forms of the malarial organisms. As a matter of fact, at the present time there are no means of differentiating the microgametes of the different species either in fresh or stained material.

The point of practical interest in regard to these recent investigations is that only those individuals in whom these sexual gametes occur are capable of transmitting malaria to the mosquito and those acting as malaria carriers. The number of patients with malaria who have gametes in their peripheral blood varies considerably in different localities and at different times, and often when they are absent from the peripheral blood they may be demonstrated in large numbers by splenic puncture.

Craig found gametes in about 33 per cent. of the estivo-autumnal infections, and in cases of recurring infection in the Filipinos to whom no quinine had been administered, crescents occurred in fully 80 per cent. of the cases, and were as numerous in the adults as in children. The percentage of patients having tertian and quartan malaria in whom gametes developed is not definitely known. Craig has found these in about 50 per cent., provided no quinine has been given and the disease has proceeded for some time.

In a general way, the absence of gametes from the peripheral blood would appear to demonstrate that the individual is not a mosquito carrier.

Darling¹ has made a study of this question and has tried to determine the number of gametes that must necessarily be present before mosquitoes will be infected, and he has arrived at the conclusion that the peripheral blood must contain at least twelve crescents per cubic centimeter, or more than one per 500 leukocytes in order to be a source of danger, and he believes that all patients whose blood contains this number should be kept in the hospital until it has been reduced well below this number by the administration of quinine.

Further work is needed along this line, for, although we know that quinine will rapidly drive the gametes from the peripheral circulation, we have no knowledge of how long it takes for them to return.

Darling found that the administration of 30 grains of quinine in solution per day would reduce the number of crescents in the peripheral blood from 67 per 100 leukocytes to 1 per 200 leukocytes in twenty-five days, and in another case they were reduced from 92 per 100 to 1 per 100 in fifteen days.

It would seem that, in malarial districts, all patients treated should

¹ Transmission of Malarial Fever in the Canal Zone by the Anopheles Mosquitoes, *Journal of the American Medical Association*, 1909, No. 53, p. 2051.

have quinine for a week or two after the disappearance of the symptoms, and that small doses, 10 grains, should be taken at least once a week for several months after the acute attack. Practically all observers are agreed that this is one of the necessary methods in combating epidemics of the disease.

MASSAGE OF THE SPLEEN IN LATENT MALARIA. In 1896 Pennato suggested that, in latent malaria, massage of the spleen would cause a reappearance of the typical chills and fever, and he reported three cases of this kind.

Fabiani¹ has recently reported a case of a man in whom the temperature disappeared entirely and in whom the most careful examination of the blood did not reveal any parasites. The spleen was slightly enlarged and tender. After palpation and compression of the edge of the spleen, the patient had some rise of temperature followed by profuse sweating. An examination of the blood forty-eight hours after the massage showed the presence of parasites in the corpuscles. The temperature again disappeared under the use of quinine. It is also said that faradization or exposure to the x-rays will also render evident latent forms of malaria.

CONGENITAL MALARIA. This has been denied by many, but there was a case reported by Dumolard and Viallet last year, and now another case is reported from Algeria by Lemaire.² The mother was suffering with malaria at the time of the birth of the child, and the child showed all the symptoms of paludism.

MALARIAL FEVER DURING THE PUERPERIUM. Atkinson³ has considered this subject briefly, the chief point of interest being the question of the use of quinine in malarial infections during pregnancy. It is a very popular opinion that quinine will bring on contraction of the uterus, and while it undoubtedly does during labor or afterward, there is some question about its effect earlier in the pregnancy. Atkinson has used quinine more or less extensively, both for the cure and the prevention of malaria, and is of the opinion that when malaria is present it expends its energy in killing the plasmodium and does not have any deleterious effects on the system.

Malta Fever. Some interesting observations have been made by Pollaci and Ceranlo.⁴ They studied the agglutinating power of the different secretions of the body, as well as the fluid obtained by blistering, and found that the saliva caused agglutination of the microbes of Malta fever. In every case in which the blood reaction was positive the dilutions of the saliva varied between $\frac{1}{5}$ and $\frac{1}{50}$, while in some cases the agglutinating power of the blood showed in dilutions up to

¹ Tommasi, April 10, 1910.

² La Semaine Médicale, June 29, 1910, p. 309.

³ Philippine Journal of Science, July, 1910, p. 193.

⁴ La Semaine Médicale, March 23, 1910, p. 139.

1 to 2000. The ingestion of medicine, even those which are in part eliminated by the salivary glands, had no influence on the agglutinating properties of the saliva. They suggest that this method be used in cases in which the blood serum cannot be obtained. They also made a study of the agglutinating power of the urine, but determined that it had no value on account of its inconstancy and feebleness.

MALTA FEVER IN THE UNITED STATES. Harold H. Smith¹ has called attention to the possibility of meeting cases of Malta fever in the United States, and has reported a case which occurred in the Carney Hospital. The diagnosis was made by the agglutination test. There was nothing extraordinary noted about the case, but it is important because it shows the possibility of meeting with tropical diseases in cities where they are not expected.

Smith notes that within a period of six months there were present at the Carney Hospital cases of relapsing fever, hookworm disease, and Malta fever.

Swelling of the Lymph Nodes in the Incubation Period of Measles. Late in 1909 Hamburger and Schey² called attention to the involvement of all the lymph nodes during the incubation period of measles, and more recently Forssner³ has reported observations made during an epidemic.

It is possible in most children to feel a certain number of lymph nodes in the neck, axilla, and groin, especially in thin children, while in fat children they frequently cannot be felt at all. It is, therefore, important to have some knowledge of the state of the glands before the disease began. It is interesting to note that the swelling is progressive, the glands becoming larger from day to day, and it is this point which is of particular value in diagnosis. In Forssner's cases, in the children in whom the nodes enlarged progressively the measles exanthem developed in all, while in the other children under observation, in whom there was no particular change in the nodes, the disease did not develop.

German Measles. Beards and Goldie⁴ have contributed a study of this disease based upon 1335 cases seen in the wards of the London Fever Hospital. In common with almost all other authorities, they believe that rubeola is a separate and distinct disease. They noticed a gradual increase in the number of cases admitted from January to March, a marked increase during April and May and the early part of June, after which there was an abrupt fall in the number of admissions. The sexes are about equally affected, slightly more females being admitted than males. The age incidence, which is given in

¹ Boston Medical and Surgical Journal, October 6, 1910, p. 538.

² Münchener medicinische Wochenschrift, 1909, p. 2309.

³ Ibid., March 22, 1910, p. 632.

⁴ Lancet, October 1, 1910, p. 1012.

comparison to cases of measles admitted during the same period, is as follows:

Age periods.	Rubeola.	Morbilli.
0 to 10 years	1.4 per cent.	20.2 per cent.
10 to 20 years	24.4 per cent.	26.1 per cent.
20 to 30 years	63.6 per cent.	46.0 per cent.
30 years and over	10.6 per cent.	7.7 per cent.

Over 98 per cent. of the cases occurred in patients over ten years of age, and over 80 per cent. of the cases of measles were in patients over ten, but these figures are of no importance in drawing any conclusions in regard to age incidence, owing to the fact that the London Fever Hospital draws its cases from a somewhat limited class.

The mild nature and absence of complications and sequelæ have been borne out in their experience at the London Fever Hospital; 1939 cases have been admitted since 1879, and there have been no deaths. In the last 478 consecutive cases the only complications observed have been rheumatic pains in two cases, and transitory albuminuria in seven patients. This is almost the universal experience, although there have been epidemics of German measles in which there was considerable mortality, notably the epidemic reported by Edwards, in which the mortality was 4.5 per cent. in a series of 150 hospital cases.

Three *types of the eruption* are described by the authors: The typical rubeola type, the morbilliform type, and the scarlatiniform type. Their description of the typical rubeola type is as follows: "It appears first on the face in small, discrete, rose-red papules, then spreads to the trunk and later to the limbs. The legs occasionally, and more rarely the arms, are unaffected, but, on the other hand, the rash may be found on the palms of the hands and the soles of the feet, though this is not so frequent as in morbilli. As new areas are involved there is gradual fading of the rash on the parts first attacked, but as the eruption persists for a shorter time on the extremities than on the face and trunk, there is a time when it is universally present and of uniform color. It is during the time of gradual fading of the rash on the face and trunk that there is a tendency for the papules to coalesce and give rise to an erythematous appearance closely simulating a scarlatiniform eruption. The punctate element is lacking, however, and the rash does not persist in the groins, axillæ, and flexures of the elbows, as is usually the case in scarlet fever. The total duration of the eruption is usually about seventy-two hours, rarely longer than ninety-six hours."

They do not lay any particular stress upon the polymorphous character of the rash, a point upon which I have insisted as being of great help in diagnosis.

The highest temperature they recorded was 102° and 104.6°, but in 450 consecutive cases there were only 14 in which the temperature

exceeded 103°. The pulse and respiration varied with the temperature. They are of the opinion that the infectiousness of the disease lasts but a short period and is not easily carried. They have failed to observe any cases which they could set down as the fourth disease as described by Dukes. They also consider the points in diagnosis from the prodromal rashes which occasionally occur in measles, chickenpox, and smallpox, and separate them by the irregular distribution and the ephemeral nature of the prodromal rashes; from measles, by the absence of Koplik spots, coryza, and cough; from scarlet fever, by the mildness of the initial symptoms, the absence of vomiting, the moderate temperature, the absence of any abnormal increase of the pulse rate, the lack of any punctate element in the rash, and the absence of the characteristic tongue appearance of scarlet fever. It is hardly necessary to consider here the other points in diagnosis to which they have called attention.

Myiasis. Swan¹ has reported two cases of myiasis occurring in Philadelphia. Both were cases of squamous-celled epithelioma, one of which had become infected with the larvæ of the *Lucilia casar*, and the other with *Lucilia sericata*. Infection of wounds, especially those which have had too little care, by means of flies is perhaps not as uncommon as the rarity of cases in the literature would lead us to believe. One reason that it is perhaps not more common is the fact that apparently the ordinary domestic house fly does not lay eggs in decomposing human tissue.

MYIASIS OF THE RECTUM. Nicholson² has reported 3 cases of myiasis affecting the rectum. The principal symptoms were anemia, great irritation of the rectum and colon, and the passage of the larvæ of the common house fly in great numbers. In all 3 cases the patient suffered from protruding piles; they were very slow at stool and were also exposed to flies during defecation. In the first 2 cases a cure was effected by protecting the patient from flies during defecation, and the same treatment was advised in the last case, but this patient was lost sight of.

CUTANEOUS MYIASIS IN THE CONGO. Broden and Rodhain³ have reported some interesting observations on the presence of the larvæ of *Lund* in the skin, both in the whites and blacks. This is the larvæ of a fly which belongs to the Genus *Cordylobia*, of which there are several species which are more or less rare in the Congo. Usually there is only one or two found on the same individual, but there have been as many as ninety-two observed on the skin of a European.

The lesion consists of an inflamed tumor which is very painful and generally ulcerated, so that one may see the end of the larva. The

¹ Journal of Tropical Medicine and Hygiene, January 1, 1910, p. 1.

² Journal of the American Medical Association, June 25, 1910, p. 1687.

³ Archives de Parasitologie, 1910.

slightest pressure causes the larva to retract and disappear in the tissues. The extraction is difficult and painful on account of the spines on the skin, which are pointed backward. As soon as the larva is removed the wound heals rapidly, leaving a small scar. The larva apparently develops in the skin of man in about nine months; if placed in the earth it will grow to the extent of 3 cm., and is transformed into a cocoon, from which it appears in about twenty-five days as the fly. It is not known how the larvæ enter the skin of man.

Meningococcus Carriers. Costa¹ has made a study of the meningococcus carriers in persons who were in contact with patients suffering with cerebrospinal fever. He had opportunities for making investigations in six instances. In the first case, which was that of an under-officer, there was but one carrier found, and this was the servant of the officer. In the second case there were two carriers who had slept side by side under the same cover for the two preceding nights in prison. In the third case there were five carriers, all of whom were about the bed of the patient. In the fourth case there was but one carrier found, and this was the patient in the next bed. In the fifth case there were eight carriers; two were in neighboring beds, one had lost his wife some weeks previously from cerebrospinal fever, and the others were not mentioned. In the last case there were seven carriers, two of which were intimate friends of the patient.

Parameba Hominis. Craig² has described this organism, which he first noted in 1906, and which he has found occurring in patients suffering from chronic diarrhea in which the attacks alternate with periods of constipation. Until recently he had observed it only in the Filipinos, but has since found it in three American soldiers who had just returned from the Philippine Islands.

Craig describes the morphology of the organism in some detail, and the reader is referred to the original article for the details. Suffice it to say that it has three stages—the amebic stage, the encysted stage, and the flagellate stage.

Paratyphoid Fever. During the past ten years, studies in the bacteriology of fevers have led to the discovery that the typhoid bacillus is not the only organism which causes a general infection, with fever, a roseola eruption, enlarged spleen, diarrhea, tympanites, and abdominal tenderness.

A general infection with the colon bacillus may give rise to a clinical picture which is very difficult if not impossible to differentiate from true typhoid. So far, only one epidemic of general infection with the colon bacillus has been reported, and it would seem that the condition is a rare one. On the other hand, there is a group of bacteria causing

¹ La Semaine Médicale, May 11, 1910, p. 227.

² Archives of Internal Medicine, July, 1910, p. 1.

fever prevailing at the same time and under the same condition as typhoid, and this group of organisms has been called the paratyphoid bacilli by Achard and Bensaude, who were the first to recognize the organism and the fact that the disease it produced was not true typhoid. They reported 2 cases, 1 of a young woman with mild symptoms resembling typhoid, who ran a temperature for forty-six days, during which time there was no leukocytosis and the Widal test was negative. They isolated from the urine a bacillus which fermented grape sugar, but which did not coagulate milk. The patient's serum agglutinated only with the bacilli which were isolated from her urine.

Later, this bacillus was supposed to be the *Bacillus psittacosis*, which was isolated in 1892 by Nocard. He found it in an epidemic disease in parrots which had been imported from South America. The *Bacillus psittacosis* seems to occupy a place midway between the true typhoid bacillus and the colon bacillus. Since that time a number of cases and studies have been made on paratyphoid, and two distinct bacilli have been isolated, one similar to the above, called paratyphoid A, and another called paratyphoid B. Paratyphoid B was first described by a number of authors, chief of which were Conradi, von Drigalski, and Jurgens, who studied the epidemic occurring at Saarbrücken in Germany.

The *Bacillus paratyphoid B* sometimes causes a disease resembling Asiatic cholera and at other times resembling mild typhoid. There is a very close relationship between the infection with this bacillus and meat poisoning, such as occurs after eating raw or slightly cooked meat, spoiled sausage, and the like, and Noble has divided all the cases of meat poisoning into two groups, the first being due to infection by the *Bacillus enteritidis* of Gärtner, and the second group caused by the paratyphoid B.

The paratyphoid B has been proved to be identical with the *Bacillus psittacosis*, the hog cholera bacillus, and the mouse typhus bacillus.

Proescher and Roddy¹ have published a rather elaborate study of the paratyphoid bacilli, including extensive agglutination and bacteriolytic experiments. They are of the opinion that if the typhoid and typhoid-like cases in America were closely studied there would be a very much larger number of cases of paratyphoid than is ordinarily supposed.

During 1908 and 1909 they found over 50 cases of paratyphoid A in the Allegheny General Hospital without a single case of paratyphoid B. During this period there were some 200 cases of true typhoid in the hospital.

The paratyphoid A is a short active motile bacillus, variable in size, and morphologically it cannot be differentiated from the typhoid bacillus.

¹ Archives of Internal Medicine, March 15, 1910, p. 263.

They found that the bacilli of paratyphoid A were killed, both in milk and bouillon, at a temperature of 70° C. in fifteen minutes. They also found that in sterile milk they retain their vigor, virulence, and characteristics for an almost indefinite length of time, but, in the presence of saprophytic organisms, both the paratyphoid A and B are destroyed in a few weeks. After standing in an absolutely dry jar for six months, the paratyphoid A bacilli were found to be alive and unchanged. The paratyphoid A bacilli are less virulent than the paratyphoid B, and they are of the opinion that the paratyphoid A does not form any extra-cellular toxins, and that toxemia is caused by endotoxins liberated when the bacilli disintegrate. They are inclined to believe that the same is true of the paratyphoid B.

Agglutination tests were positive as early as the second or third day. There is a difference of opinion among the various authorities as regards the lowest dilution of the patient's serum, which is of value in making the agglutination test, being variously placed from 1 to 10 up to 1 to 75. Proescher and Roddy found that the bacteriolytic experiments give more accurate results than the agglutination tests, but owing to the amount of time and labor required, were not as valuable from a diagnostic standpoint.

AN EPIDEMIC OF THIRTY-FIVE CASES OF PARATYPHOID FEVER. Hoskins¹ has reported an epidemic of paratyphoid fever at Weyer's Cave, Virginia. The character of the fever resembled, in a general way, that of typhoid. The exact method of transmission of the disease was not at all clear. The incubation period varied from one to two weeks, as near as could be judged, and during this period the health of the patient was good, the symptoms beginning with languor, headache, pains in the back and limbs, and with nose-bleed in several cases. Most of the cases were constipated, but in five there was a profuse diarrhea. The prodromal symptoms increased, and there were, in addition, bronchitis in over half of the cases, headache, chilliness, especially of the feet and legs, pain in the lower part of the abdomen and in the extremities. About one-fourth of the cases presented a peculiar symptom in having horrible dreams during the waking hours. There was wide dilatation of the pupils in all the cases, and the reaction to light was very slow. Rose spots were common and were seen in two-thirds of the cases.

The prognosis in this epidemic was decidedly good, all the patients recovering, and the treatment was very similar to that used in typhoid fever.

The diagnosis was made in a number of cases by the fact that the serum of the patient gave typical agglutination reactions with the paratyphoid bacillus B. Of 16 of the cases, 15 gave a positive reaction to

¹ Journal of the American Medical Association, March 9, 1910.

the paratyphoid *Bacillus B*, and none of them gave a positive reaction with the typhoid bacillus.

It must also be noted that of the tests made in 38 individuals, for the most part healthy members of the household in which cases of fever had developed, 5 gave a positive reaction. It was impossible to recover the paratyphoid *B* bacillus from the stools, although numerous attempts were made to do this by the use of Endo's medium. Blood cultures from the cases remained sterile.

These epidemics of paratyphoid are of particular interest from a standpoint of diagnosis, as short duration typhoids might be easily mistaken for the paratyphoid *B* in the absence of a specific reaction.

MENINGITIS IN PARATYPHOID. Paratyphoid fever is, as a rule, not attended with many dangerous complications, and I believe that for the first time a case of meningitis due to the paratyphoid bacillus *B* has been described by Inclan.¹

The patient was a child, aged four years, who was taken ill suddenly with high fever, vomiting, and headache. This changed to a typhoid condition, and the Widal reaction was negative. On the fourteenth day there were convulsions, the patient became apathetic and then delirious, with a stiffness of the neck; Kernig's sign was present and there was abolition of the pupil reflexes to light. Frequent lumbar punctures somewhat bettered the condition, but the patient finally died.

The cerebrospinal fluid showed a marked polymorphonuclear leukocytosis and the presence of the *Bacillus typhoid B*. This bacillus was agglutinated by the blood serum of the patient.

PARATYPHOID AND THE PUBLIC HEALTH. Another article of interest, which calls attention to the importance of paratyphoid as a disease to be reckoned with by public health officers and also by army officers, is that of Hübener.² A complete study, with a full list of references to the literature, has been published by the same author as a monograph on the subject of the origin and prevention of meat poisoning and paratyphoid infections.³

PARATYPHOID A INFECTION IN SUCKLINGS. Eckert⁴ has reported a most interesting case of infection in an eight-months-old baby. The child was taken early in March with pneumonia, and nearly a month later symptoms of meningitis appeared. An organism similar to the paratyphoid *A* bacillus was found in the fluid from lumbar puncture, and, at the autopsy, the paratyphoid *A* bacillus was found in the heart and blood. This is perhaps the first instance of the paratyphoid *A* infection in an infant, and it adds another disease to the list of possibilities to be thought of in diagnosis.

¹ *Prensa Médica de la Habana*, June 15, 1910.

² *Berliner klinische Wochenschrift*, June 13, 1910, p. 1099.

³ *Fleischvergiftungen und Paratyphusinfektionen, ihre Entstehung und Verhütung*. Fischer, Jena, 1910.

⁴ *Berliner klinische Wochenschrift*, June 16, 1910, p. 1102.

Pellagra. CAUSE AND TRANSMISSION OF PELLAGRA. 'Sambon' has made a study of pellagra in Italy and carried on researches in England.

He is convinced that pellagra is of parasitic origin, and that the disease is transmitted by a midge of the genus *Simulium*, and claims to have established the connection between this midge and pellagra. The disease follows water courses and does not enter houses, so that only those who are outdoors are liable to be infected. In families where all the members are exposed, all are liable to contract the disease. Where there is only one case in a family, it was found that one individual had probably been infected in one locality and then returned home, and the disease not being contagious, the remainder were unaffected.

These observations are of extreme interest to us in America, owing to the recent discovery of many cases of the disease, and it will be important to have investigations made along similar lines to determine whether or not there is a presence of the same or a similar midge in this country which might be held responsible for the disease. As is well known, the disease has usually been attributed to the eating of spoiled maize.

Another theory has been advanced by Long,² namely, that pellagra is a disease resulting from an injury to the intestinal mucous membrane, and this injury is the result of the action of the ameba. He believes that, as a result of the ulceration produced, the absorptive power of the intestine is lessened, and finally changes take place in the pancreas and liver, resulting in serious interference with the digestion. He believes that this favors the production of certain toxins, the absorption of which is harmful to the body, and that the symptoms of pellagra are due to the chronic poisoning that is produced. Working on this hypothesis, the pellagra patients were treated with enemata of quinine bisulphate in normal salt solution, and put upon a diet of milk, toast, rice, and starchy foods. Pancreatin was administered in specially coated capsules. Under this treatment, quite a large percentage of cases were improved, and some entirely cured.

Piroplasmosis. An increased interest has been shown in the study of parasites other than bacteria, and among these the piroplasm has come into more or less prominence. The piroplasmata are protozoa, of the group sporozoa, belonging to the subdivision hemosporidia. The complete life history of these parasites is not yet fully known, but the disease is transmitted by the bite of infected ticks, the tick being the definitive host. In the tick the parasites undergo certain sexual changes, but in the body of animals they either pass into the red blood corpuscles, or they divide into two halves, which either leave the corpuscle or the corpuscle dissolves and sets them free, and these

¹ Il Policlinico, June 19, 1910, p. 771.

² Journal of the American Medical Association, August 27, 1910, p. 734.

as free parasites invade other corpuscles and again go through the same process.

Mettam¹ has given a résumé of the characteristics of some of the various piroplasmata affecting the various animals—the horse, ox, sheep, and dog and has detailed a number of experiments made with the parasites found in Ireland.

Plague. McCoy² has contributed one of a series of papers prepared for the Council of the Defence of Medical Research. He briefly reviews our knowledge of the plague, calls attention to the discovery of the plague bacillus, to the association of the disease with rats, and the work of Simond concerning the transmission of plague from one animal to another by means of fleas.

Without going into the details of the article, it might be well to call attention to the fact that, by the use of preventive inoculations after the manner of Haffkine, the incidence of the disease in the inoculated is less than one-third of that among the uninoculated, and the mortality of those who were inoculated and had developed the disease was very much less—17 per cent., as against an average of about 45 per cent. in the uninoculated. In other words, the chances of dying with plague is about eight times greater in the uninoculated than in those inoculated. An improvement upon this method is said to be that of Strong, who advocates the use of living, but attenuated, cultures. This method has not as yet been sufficiently tried, but it seems destined to be of great value.

Yersin, Calmette, and Borrel have succeeded in producing a curative serum which is of great value if administered very early. The unfortunate part of this is that the diagnosis is rarely made early enough to give the patient the full benefit of the treatment, but apparently those injected on the first day with a sufficient amount can nearly always be saved.

SUSCEPTIBILITY OF ANIMALS TO PLAGUE. McCoy and Smith,³ in following up the studies made by McCoy in regard to the susceptibility of animals to plague, have determined that a number of other animals are susceptible and may be easily infected. Among these are the rock squirrels, the prairie dogs, and desert wood-rat. Altogether they determined that the following animals may be found infected in nature: The California ground squirrel, the dusky footed wood rat, the black rat, the brown rat, the house mouse, and the guinea-pig. This has a practical bearing upon the prevention of plague during epidemics, as any of these animals may be the means of prolonging the disease, or of transmitting it from place to place, or to other animals.

¹ Dublin Journal of Medical Sciences, April, 1910, p. 251.

² Journal of the American Medical Association, July 16, 1910, p. 186.

³ Journal of Infectious Diseases, May 20, 1910, p. 374.

CATS AS PLAGUE PREVENTERS. Buchanan¹ is a strong advocate of the introduction of cats in plague-stricken districts as a method of preventing the disease. This method of keeping down the rats has been recommended by Koch, and is now being advocated by Kitasato, in Japan. The cats are used in Japan very extensively, in order to protect the silk industry from rats. It is considered to be one of the best methods of combating the rat evil.

One of the causes of failure in the use of cats in India is due to the fact that the number kept is too small to combat the number of rats about the houses. In many places there are large numbers of servants' houses without any cats at all. In order to be thoroughly effective, a sufficient number must be kept, not only to keep the rats down in the dwelling houses, but in stables, warehouses, and other places where they tend to breed.

TREATMENT OF PLAGUE. Masuyama² has reported in detail four years' experience in plague epidemics in Japan. The most interesting part relates to the treatment. Various heart stimulants were used, such as digitalis, strophanthus, and certain antipyretic drugs. In addition to this, serum therapy was employed, the patient being given from 40 to 320 c.c., and the results were, in the main, rather unsatisfactory.

The best results were obtained by the combination of serum and operative interference. He advises that after the injection one should wait until fluctuation of the bubo occurs, when it should be incised with as little disturbance of the deeper tissues as possible. In 163 cases, 129 were of the bubonic type, and under ordinary treatment 4 recovered and 125 died. In comparing the results of operation in 82 cases, enucleation was tried in 57 cases, of which 28 were cured and 29 died. Incision was tried in 25 cases, with the result that 19 recovered and 6 died. In 89 cases in which the serum was given, 78 were of the bubonic type; of these, 9 were cured and 69 died. In the combination of serum and operative interference in 69 cases, incision was made in 32 with a cure in 25 cases and death in 7; enucleation was tried in 32 cases, with 10 recoveries and 22 deaths.

Among the various methods that have been suggested for the treatment of bubonic plague is the use of adrenalin.

Anderson and Thornton³ have tried this method in two epidemics, with unusually good results. They were struck with the extreme congestion of all the organs, particularly of the adrenals at autopsy, and wondered if the use of the vasoconstrictor would not moderate the general congestion. At first they gave 30 drops of a 1 per cent. solution of adrenalin with 10 drops of tincture of strophanthus every

¹ British Medical Journal, August 6, 1910, p. 305.

² Zeitschrift für klinische Medicine, 1910, vol. lxx, p. 491, Nos. 5 and 6.

³ La Semaine Médicale, April 13, 1910, p. 179.

four hours during the first three days, and three times a day for about two weeks later. Later on, in the more severe cases, the adrenalin was used hypodermically, the injection being given in the neighborhood of the buboes, the doses being given in 20 drops of a 1 per cent. solution. Under this method of treatment the general prostration improved and the circulation became stronger. It had no effect upon the other symptoms. In 50 cases treated by this method there were 15 deaths, 2 of which were due to other causes than plague, and in 936 cases in the same region (Cape Colony) there was a mortality of 37.4 per cent. It would seem that, in the absence of any better method, this was worthy of a trial.

Pneumonia. PNEUMOCOCCUS SEPTICEMIA AND HEMOGLOBINURIA. Meyer¹ has reported an instance of an exceedingly rare condition in which a man, aged twenty-one years, was taken suddenly with headache, pains in the shoulders, and later with great prostration. There was nothing particular to be made out on physical examination, but there was a leukocytosis of 42,000 with only 900 lymphocytes, and the most notable thing was a marked hemoglobinuria coming on the same day as the other symptoms. The patient grew rapidly worse, and became tremendously cyanosed until the appearance was almost dark blue, and there was a slight icterus. The blood showed a marked fall in leukocytes, and methemoglobin upon spectroscopic examination. At the autopsy it was found that the patient had a pneumococcus septicemia. There was pneumonia of the right lower lobe with fibrinous pleuritis, and involvement of the lymph vessels of the lungs of the right upper lobe. There was also bronchitis and inflammation² of the trachea. There are scarcely any references in medical literature to hemolysis caused by the pneumococcus, so that this observation is of particular interest.

BLOOD CULTURES IN PNEUMONIA. Strouse and Clough² have reviewed the literature dealing with blood cultures, and report their own investigations in 25 cases. From the result of their own and the work of other observers, they have concluded that blood cultures are positive in the majority of all cases in certain epidemics, and that in such cases the results of blood cultures furnish material which is of no prognostic value. Sometimes the pneumococci may be obtained from the blood of patients after the crisis, and a failure to obtain organisms in the blood is due partly to the difficulties in technique and partly to other factors.

TRAUMATIC PNEUMONIA. Weber,³ at the end of an article on traumatic tuberculosis, considers the subject of traumatic pneumonia and traumatic pleurisy, referring particularly to what might be called a

¹ Münchener medicinische Wochenschrift, February 8, 1910, p. 300.

² Johns Hopkins Hospital Bulletin, August, 1910, p. 247.

³ British Medical Journal, May 14, 1910, p. 1153.

contusional pneumonia, which may or may not be associated with fractures of the ribs.

Külbs¹ has studied this question in animals, and found that, in greater or lesser contusions of the thorax, the changes were chiefly slight injuries to the pleura, while sometimes, after very violent blows, the lung tissue and pleura were found to be considerably torn. The process of repair and the development of ordinary granulation tissue were noted in those cases in which the animals were killed some time after the injury. The changes were not always limited to the region of the thorax where the blow had been received. These lesions were not typical traumatic pneumonias. In order to produce this condition there must be present either the pneumococcus or other bacteria.

Litten, in 1881, pointed out that some of the cases following injury were not tuberculous microbic pneumonias, but were due to hemorrhagic infiltration, such as Külbs has produced in dogs. He relates one or two cases—one of a boy, aged eight years, who was run over by a cart. Following this, there was a rise in temperature, dyspnea, general uneasiness and cough, pain in the lower front part of the chest, and impaired resonance of the lower part of the right lung, together with signs of bronchitis. After about ten days' time the temperature gradually disappeared and the lung cleared up, although there were some lessened breath sounds over the right lung. Cases of this kind might be multiplied considerably. Sometimes the physical signs of changes in the lungs are much more marked than in others.

Sometimes pneumonia follows the lifting of heavy weights. The shortest interval between the trauma and the development of the pneumonia, according to Litten, is ten hours, but the average period is about two days. Litten is of the opinion that six days is the maximum interval, and von Leyden has reported a case in which it was fourteen days.

This is not the place to go farther into the subject of traumatic pneumonia, but any one interested in this subject should refer to the excellent article of L. Müller.² All of the recent cases are abstracted and commented upon, and those interested in the medicolegal side of the subject will find a very complete discussion of the subject.

ATYPICAL PNEUMONIAS. Gross³ has contributed an interesting study on the subject of *asthenic pneumonia*, and calls attention to some of the principal features concerning the diagnosis.

The disease usually begins with a general feeling of weakness, headache, indisposition to move about, and, later, pain in the back and joints. Fever gradually comes on and sometimes chills, and sooner or later the patient takes to bed. The temperature at the beginning

¹ Archiv für experimental Pathologie und Pharmacologie, Leipzig, 1910, p. 39.

² Centralblatt für de Grenzgebiete für Medicin und Chirurgie, January 26, 1910, p. 11, and February, March, and April, 1910.

³ Deutsches Archiv für klinische Medicin, 1910, Heft 1 and 2, p. 94.

is usually low, and gradually increases, getting higher in the evening. There are frequent chilly sensations in the evening, and, after restless nights, marked sweats toward morning. In many instances the patients become more or less somnolent. They usually have the appearance of patients with a severe illness, and in many instances the diagnosis of typhoid is improperly made. Upon early physical examination no dulness is found, but after more or less time there is a period in which the breathing is accelerated, and a day after this marked dulness and bronchial breathing may be easily made out. Gross usually noticed that this took place on the edge of the lung, more often of the right lower lobe and most generally on the first day of the crisis, or even a day later. In some instances, the infiltration of the lung, beginning in the centre and extending outward, may be made out. The clinical picture of the disease in a general way resembles that of ordinary lobar pneumonia, but the sputum is different in that it is thinner, more abundant, and of a light red color somewhat resembling the sputum following a hemorrhage; in one of the cases the diagnosis of hemoptysis was made in the clinic.

The disease often appears to be epidemic in character, and, in 18 cases, 4 instances were noted in which 2 cases occurred in the same family.

Postoperative Pneumonia. Risley¹ has analyzed 1000 operative cases, all laparotomies for various conditions. The total mortality was 13 per cent. He concluded that postoperative pulmonary complications are most liable to develop in cases in which sepsis is present, and especially when there has been some injury, not to the air passages, but to the peritoneum. This view rather bears out the opinion of Payr, that postoperative lung complications are due to minute emboli rather than to irritation by ether or infection through the air passages.

There was involvement of the lung present in 3 per cent. of the cases before operation, but the administration of ether did not cause any previous pneumonia to start up again. The lung complications were found much more common during the winter months, and clean cases were nearly as liable to such complications as the septic cases. The mortality, however, of the clean cases was practically *nil*, and the cases were atypical and less severe. In cases with tuberculosis of the lung, there was frequently an increase in the condition, although the exact percentage of cases in which this occurred was not determined.

Risley suggests, as a prophylaxis of pulmonary complications, a much more thorough preparation of the mouth before all operations, such as a ten minute scrubbing of the teeth three times during the twenty-four hours previous to the operation, followed by a thorough washing of the mouth, nasal passages, and throat with Dobell's solution.

¹ Boston Medical and Surgical Journal, January 20, 1910, p. 75.

He thinks it advisable to use the Trendelenburg position in all prolonged operations when practical, and when gravitation of septic material toward the diaphragm can be prevented by walling off. He uses atropine and morphine subcutaneously half an hour before etherization, and is in favor of the Crile method of anesthesia when it is possible to use it.

Poliomyelitis. One of the most striking things that has occurred during the past year is the increased interest and the remarkable discoveries made in connection with poliomyelitis; indeed, to those whose conception of the disease is based upon the text-books of a few years ago the newer ideas will come as a sort of revelation.

Anterior poliomyelitis, as it is most usually called, is an old disease, and epidemics of it have been described in America, Europe, and Australia. According to Holt and Bartlett,¹ the first epidemic occurred in America in Louisiana, in 1841.

To Heine we owe the first clear-cut description of the disease, and in 1888, Cordier² mentions the contagiousness of it; while Medin³ described it definitely as an infectious disease, the epidemic character of which was more fully considered by Wickman⁴ in his monograph. Among the more recent investigations may be mentioned those of Landsteiner and Popper, who succeeded in transmitting the disease by inoculating into rabbits the portions of the spinal cord of children dead from the disease, and this was followed almost immediately by the brilliant work of Flexner and Lewis⁵ in America, and of Landsteiner and Levaditi⁶ in France, Römer and Joseph,⁷ Krause and Meinicke,⁸ in Germany, and of Leiner and Wiesner,⁹ in Austria.

Reports of some of the epidemics have also appeared during the last year, chief among which may be mentioned that of the epidemic in New York,¹⁰ in 1907, and the excellent report for the State Board of Health, of Massachusetts, by Lovett, of the occurrence of infantile paralysis in Massachusetts¹¹ in 1909. In addition to these articles

¹ American Journal of the Medical Sciences, 1908, vol. i, p. 647.

² Lyon Médical, 1888, pp. 5 and 48.

³ Verhandlungen des X International Medical Congress, Berlin, 1890, vol. ii, p. 37.

⁴ Beiträge zur Kenntniss der Heine-Medicinischen Krankheit, Berlin, 1907.

⁵ Journal of the American Medical Association, November 13, 1909, p. 1639; December 4, 1909, p. 1913; December 18, 1909, p. 2095; January 1, 1910, p. 45; February 12, 1910, p. 535; April 2, 1910, p. 1140; May 28, 1910, p. 1780; September 24, 1910, p. 1105; Journal of Experimental Medicine, March 14, 1910, p. 227.

⁶ Comptes rend. de la Soc. Biol., December 3, 1909, and December 24, 1909.

⁷ Münchener medicinische Wochenschrift, February 1, 1910, p. 229, and May 3, 1910, p. 945.

⁸ Deutsche medicinische Wochenschrift, October 21, 1909; *ibid.*, p. 1825.

⁹ Wiener klinische Wochenschrift, January 20, 1910, pp. 83 and 329; October 15, 1910, p. 2482.

¹⁰ Nervous and Mental Disease Monograph, New York, 1910, No. 6.

¹¹ Medical Communications of the Massachusetts Medical Society, 1910, p. 779.

may be mentioned the report of Stephens,¹ of Müller,² and of Shidler.³ Other communications, too numerous to mention, have been made, a partial list of which will be found in Lovett's article.

We must look upon the disease as one of the specific infectious maladies capable of being transmitted in some way from child to child, and we shall see that the disease is caused by a specific virus which may be transmitted experimentally to monkeys, that the disease occurs in all grades of severity with a great variety of clinical symptoms, chief of which are those relating to the changes which take place in the spinal cord, but which may also take place in the medulla and the cerebrum, and this leads to great possibilities in regard to mistakes in diagnosis.

TRANSMISSIBILITY. The question of how the disease is transmitted from one individual to another is a subject which requires further study. There are several possibilities. One is that the disease is acquired by contact; a second, that it may be carried from one person to another by an otherwise healthy carrier; and there is some evidence of house infection. In the New York epidemic, the disease apparently spread away from the city along the lines of travel, still it would seem that there is not very much danger from living about a case. Emerson,⁴ in a study of the Deerfield Valley epidemic which occurred in 1908, made a study of 67 cases. There were 166 other children in the same families, and 86 of the children came in close contact with the patients. Out of the 252 cases, only 4 contracted the disease. Hill⁵ reports that in 81 cases occurring in 69 families, there were 12 second cases, or a percentage of 17 per cent. Comparing this to the incidence of other infections coming on secondarily in the same State (Minnesota), they found that scarlet fever was 40 per cent.; typhoid, about 30 per cent.; diphtheria, 29 per cent. Lovett, in 142 cases occurring in Massachusetts in 1909, found 134 in which there was one case in a family, seven instances in which there were 2 cases, and one instance in which there were 3 cases.

A possible source of infection which has been suggested is that the disease is carried by some insect. Just what this insect is, or whether this is true, has not been determined, but it should prove a subject of interest, if not of fruitful research.

The virus has been found in the brain, spinal cord, and also in the mucous membranes of the nasal pharynx. It has also been found in the lymph nodes, and Landsteiner and Levaditi have found it in the salivary glands. Flexner and Lewis also found that in the acute stage it was present in the blood and in the cerebrospinal fluid. Emul-

¹ Transactions of the Australasian Medical Congress, Victoria, 1909, p. 42.

² Münchener medicinische Wochenschrift, November 30, 1909.

³ Journal of the American Medical Association, January 26, 1910.

⁴ Bulletin of the Massachusetts State Board of Health, 1909.

⁵ Northwestern Lancet, March 15, 1910.

sions of the virus have not been impaired by standing as long as seven days, or by freezing, or by suspension in glycerin, and these results have been confirmed by Landsteiner and Levaditi, by Flexner and Lewis, and by Römer. The virus is not weakened by dilution, and Leiner and Wiesner found that the dilution of 1 to 1000 worked fully as well for purposes of infection as the full strength. Flexner and Lewis have determined that the virus is easily killed by heat, a temperature of from 45° to 50° C. rapidly destroying it.

The incubation period in monkeys dates from the time of the inoculation to the appearance of the first definite symptoms, and varies between four and thirty-three days, with an average of 9.82 days.

Up to the present time cultures of the virus have not been obtained in a very satisfactory manner, although Flexner and Lewis, and Levaditi found that when inoculated into a fluid culture media, either serum or ascites bouillon, after several days the culture media became cloudy, and the presence of the virus could be determined by inoculation experiments. Further inoculations of cultures from this, while resulting in a clouding of the culture medium, did not cause the disease by inoculation. Various studies have been made concerning the nature of the virus. Levaditi found numerous small stained bodies in the cultures, and Bonhoff has described bodies similar to the negri bodies, such as have been described in rabies. The whole subject of the growth of the virus in artificial cultures may be regarded as a subject for further study.

INOCULATION EXPERIMENTS. Numerous experiments have been made, chief of which may be mentioned those of Flexner and Lewis in America, Landsteiner and Levaditi in France, and Leiner and Wiesner in Austria. The first inoculations were made by taking the portions of the cord of a child who had died from the disease and inoculating these directly into the spinal canal of a monkey. It was subsequently found that the disease could be transmitted by intracerebral inoculation, also subdurally and into the sheaths of the larger nerves. It was then found that it could be transmitted by injecting it about the nerve sheaths, and subsequently that it could be transmitted by intraperitoneal injections, subcutaneous injection, or by injecting the virus directly into the circulation. It may also be transmitted by inoculation into the anterior chamber of the eye, and Leiner and Wiesner found that, if the stomach and intestine were paralyzed by the use of opium, the disease could be transmitted by placing the virus in the stomach. Flexner and Lewis succeeded in transmitting the disease by rubbing the virus upon the scarified mucous membrane of the nose and pharynx, while Leiner and Wiesner found that this could be done without scarification, that the disease could also be transmitted by inhalation or by placing the virulent tissue in the trachea.

The only animals that are susceptible to the disease are monkeys.

Krause and Meinicke have published a report in which they claim to have produced the disease in rabbits, but their experience is so at variance with the results of other experimenters, that they may be regarded as very doubtful. Römer inoculated the virus into horses, calves, goats, pigs, sheep, rats, mice, and guinea-pigs, the results being negative in all. Beneke¹ tried inoculation into rabbits and chickens, the results of which were negative. Inoculations into dogs also failed.

Full accounts of the animal experiments may be found in the report of Flexner and Lewis.² In some instances the monkeys fell ill and died without paralysis having been noted. After the immediate effects of the anesthetic have worn off, the animals are apparently normal until from six to forty-eight hours prior to the onset of the paralysis, when they become nervous and excitable. Upon being disturbed and made to move about in the cages, they tire quickly, and there is a tremor of the head, face, or limbs, and, when the attention can be attracted, the gaze is shifting, rather than fixed, as in the normal monkey. The face is wrinkled and mobile rather than smooth and placid, and the animal prefers to remain quiet. The paralysis comes on either with or without premonitory signs. Any of the larger groups of voluntary muscles may be involved first. Together with the paralysis of groups of muscles, other muscles are found to be either weak or partially paralyzed. Sometimes the disease starts with symptoms showing involvement of the medulla or of the cerebrum. Many of the affected animals died, and a considerable number were sacrificed in order to study the pathology of the disease, but the inoculated monkeys may recover. In some instances, the paralysis recovers; in others, it is apparently permanent, although perhaps a sufficient length of time has not elapsed in order to determine this point.

THE PATHOLOGICAL ANATOMY. The pathology of experimental poliomyelitis probably does not differ appreciably from that in human beings. In fatal cases, the cord and its membranes show visible lesions of varying intensity. The pia mater is usually congested, the hyperemia being most apparent at the lumbar and cervical enlargements. There are no gross lesions in the white matter, but the gray matter is edematous and congested, and there are small punctiform hemorrhages sometimes as large as a pinhead. The lesions are not diffuse or uniform, but tend to be most marked in those regions of the spinal cord corresponding with the paralyzed groups of muscles, but the lesions are not at all limited to these regions. Similar lesions may be seen in the medulla; as a rule, no gross lesions of the brain have been observed. The general appearance of the spinal cord and of the medulla and brain are not greatly altered; the changes visible to the naked eye are in no way a measure of the damage which has been done by

¹ *Münchener medicinische Wochenschrift*, January 25, 1910.

² *Journal of Experimental Medicine*, March 14, 1910, p. 227.

the virus. The histological lesions are more severe in the cord than in the brain, and are most pronounced in the gray matter. The severest lesions tend to correspond to the areas supplying the most markedly paralyzed muscle groups, although this is not always true. The meninges show a more or less diffuse infiltration of the round cells, especially the layer next to the white matter of the cord. There are also large accumulations of cells about the bloodvessels, the sheaths of which are surrounded by a thick layer of cells. The muscular coats and intima remained intact, but the lumen of the smaller vessels is sometimes interfered with by pressure. There is considerable infiltration of the adventitial and perivascular lymph sheaths and the adjacent pial membrane, and this extends into the cord. In the white matter, there is some perivascular infiltration, some edema, sometimes hemorrhages, together with degeneration or necrosis of the nerve tissue. There are often no connections between these lesions and the lesions in the gray matter, but sometimes it is continuous, and there is a tendency for the white matter nearest the affected horns to be involved. The lesions in the gray matter consist of changes in the anterior and posterior horns and in the commissure. As a rule, the anterior horns suffer most severely. There is edema, marked cellular infiltration and hemorrhage, degenerations of the nerve cells, and some necrosis; in some places the nerve cells disappear and leukocytes occupy their space. Not all the nerve cells in a segment show equal degeneration and it is only in rare instances that the entire width of the anterior horn is degenerated. Similar changes may be seen in the medulla, and sparingly in the brain.

IMMUNITY. One attack of poliomyelitis apparently produces immunity in monkeys, and doubtless in human beings as well. This has been noted experimentally by Landsteiner and Levaditi, Flexner and Lewis, Römer and Joseph, and Leiner and Wiesner. It has also been determined that monkeys may be immunized by repeated small doses of the virus. A passive serum protection may be obtained by mixing with an active virus, an equal amount of blood serum from a monkey or a child who has recovered from the disease. Attempts to secure a neutralizing serum from horses have not been successful.

THE POSSIBILITY OF SECOND ATTACKS. Ashner¹ has made a study of the literature on this subject, and has arrived at the conclusion that one attack confers relative immunity to subsequent infection. Relapses and second attacks in the person are rare, although what seem to be instances of this have been reported. It would seem that the immunity comes on slowly, and second attacks, or what may possibly be relapses, may occur at short intervals, but this is of very exceptional occurrence. It seems to be an almost uniform opinion of those who

¹ Medical Record, September 24, 1910, p. 526.

have studied the disease that it predisposes to other diseases of the spinal cord in later life.

INCUBATION PERIOD. The incubation period in monkeys, as noted above, varies from six to over thirty days. The incubation period in the human being is not known, but has been variously placed by different observers at from one to fourteen days, although it is possible that the period is longer, and the cases occurring in the late fall and winter may have been acquired in the late summer or early fall.

REFERENCE TO PARALYSIS IN ANIMALS. This is a subject about which there has been considerable discussion both in the medical and lay press, and one which at the present time cannot be regarded as definitely settled, although it seems probable that there is no definite connection between the cases of illness and paralysis observed in domestic animals and poliomyelitis in human beings. Many outbreaks occur coincidentally, but, owing to the fact that it is impossible to infect the ordinary domestic animals experimentally, and according to the careful reports of the epidemics in Massachusetts it would seem safe to state, pending further investigation, that there is no danger from animals.

In the Massachusetts epidemic, in 34 out of 87 families, there was the history of paralysis, sickness, or death in domestic animals, but it should be remembered that disease among domestic animals is exceedingly common, and paralytic symptoms are frequently observed quite apart from poliomyelitis. Shore, a veterinarian, of Lake City, Minnesota, in a letter in the Massachusetts report 1910, mentions a disease which he has seen in young colts, which bears a striking resemblance to poliomyelitis and which should be investigated further.

FREQUENCY AND OCCURRENCE. The disease is widely distributed. In the past ten years, epidemics have been reported from Norway, Sweden, Germany, Austria, Holland, United States, Cuba, and one epidemic in Spain. There have been no epidemics in France, but many scattered cases, and a few cases in England. Since Bergholtz (Sweden), in 1881, called attention to an epidemic, there has been a greater frequency of reports, and this is partly due to the better recognition of the disease, but this scarcely explains the increase that has occurred in the past five years. This is well shown in the following table from Lovett's article, giving the number of cases and outbreaks since 1880:

	Cases.	Outbreaks.	Average number of cases.
1880-1884	23	2	11.5
1885-1889	93	7	13.0
1890-1894	151	4	38.0
1895-1899	345	23	15.0
1900-1904	349	9	39.0
1905-1909	8054	25	322.0

The disease is more liable to occur in cold climates than in warm ones, but one epidemic has been reported from Cuba by Lebrede and Recio.¹ This epidemic is of special interest, as it is the first one that has occurred in the tropics. There apparently have been no cases of the disease in Cuba prior to 1907; in 1907 and 1908, there were a few cases about Havana, and the disease was probably imported from New York. In 1909, an epidemic was reported in the Santa Clara province which reached its maximum in July and August. It affected chiefly males, and the greatest number of cases occurred between one and three years of age. The total mortality of the disease was 7.89 per cent. The blacks were affected much less than the whites, and in 72 cases, 60 were in whites, 8 in blacks, and 4 in mixed races.

The experience in Massachusetts has been admirably dealt with by R. W. Lovett, of Boston, and reported for the State Board of Health in their *Bulletin*, and also in the *Transactions of the Massachusetts Medical Society*. The disease was studied from a great many different standpoints, which may be briefly mentioned. The disease bears no relation to rabies. It was most frequent in July and August, but does not correspond to the temperature, the highest average temperature falling away before the highest incidence of the disease is reached. It is curious to note that the driest year preceded the year of greatest prevalence, and the driest month of the year preceded the greatest number of cases, but other than that the incidence of the disease does not seem to correspond to the rainfall. It occurred more often in dry than in damp houses, and 105 cases were noted as occurring in dry houses and 45 in damp houses, out of 150 that were especially studied. Most of the cases were noted as having occurred in old houses, but one must bear in mind that in Massachusetts many of the houses are old, so that this might have been expected. It seemed to bear no apparent relation to railroad or water traffic, although in Sweden the disease has been especially observed along railroad lines.

Relation to Insects. In the last report, a careful study was made in regard to insects and other vermin. In 142 families, 134 had some sort of insects or animals about, as shown in the following table.

¹ Sanidad y Benéficencia Boletín Oficial de la Secretaría, Habana, March, 1910.

	Families.
Flies were present in	113
Mosquitoes were present in	75
Mice (house) were present in	63
Rats were present in	54
Ants (red and black) were present in	35
Roaches were present in	35
Bedbugs were present in	31
Spiders were present in	28
Mice (field) were present in	20
Squirrels were present in	6
Biting flies were present in	3
Grubs and caterpillars were present in	3
Fleas were present in	2
Brown tail moths were present in	1
Moles were present in	1

Sex. In the Massachusetts epidemic there were 363 cases in males, as against 263 cases in females.

Race. It was noted in the Cuban epidemic that very few negroes were affected. In the New York epidemic, in 1907, in which there were some 752 cases carefully studied, only 2 occurred in colored children. This fact seems remarkable in view of the statement made by the United States Census Bureau, that the colored race is more susceptible to disease of the nervous system than is the white.

Age. The age of greatest incidence is between two and three years; after ten years the cases are much less frequent, although adults are by no means exempt. The earliest cases in the Massachusetts epidemic occurred at three weeks of age, and the oldest, seventy-two years; 71 per cent. of the cases occurred in the first five years of life, and 87 per cent. in the first ten years of life. This incidence is well shown in the following table from the New York report:

	Wickman, 1905.	New York.	Rutland.	Göteborg.	Stockholm.	Sinedje- bacher.	Shelby.	Gloucester.
Up to three years	169	463	90	11	34	30	10	16
From 3 to 6 years	181	197	90	5	12	30	0	10
From 6 to 9 years	154	40	15	2	1	20	2	3
From 9 to 15 years	165	21	15	0	1	20	5	2
Fifteen and over	199	8	15	2	5	0	3	0

The relation between the mortality and the age is shown in the following table of the Massachusetts report for 1910:

Age.	Cases.	Deaths.	Mortality, per cent.
Under 1 year	44	7	16
One to 10 years	494	20	4
Over 10 years	77	16	20
Not stated.	13	8	—
	628	51	..
Average mortality	8

Food. No definite conclusions can be drawn as regards the food, yet it is interesting to note that, in the Massachusetts epidemic, there was not a single case in a child who was being nursed at the breast alone. In the New York epidemic, however, 121 out of 752 cases were entirely breast-fed.

RELATION TO OTHER DISEASES. This is very questionable. The disease probably bears no relation whatever to any other disease. Brorström¹ has published a monograph in which he tries to prove that it is a nervous form of influenza, but he is practically alone in his opinions.

In the New York epidemic, the disease was noted occurring coincidentally with 2 cases of measles, 3 cases of whooping cough, and 1 each of pneumonia and marasmus.

PRODROMATA. Prodromata may be entirely absent. Fever is the most common prodrome, while irritability and restlessness are quite common, and diarrhea is frequently observed. Headache and apathy are sometimes observed, and insomnia, weakness in the legs and suppression of the urine have all been reported. Coryza, cough, and photophobia may also be mentioned. Pain may be observed as an early symptom. It may be general, in the back, or confined to the arms and legs.

SYMPTOMS. The symptomatology of the disease is worthy of careful study, as the picture apart from the paralysis may vary greatly. This is well shown in the table of early symptoms reported in the Massachusetts epidemic:

SYMPTOMS REPORTED IN 147 CASES.

Fever	132	Dyspnea	4
Pain	110	Sore throat	8
Tenderness	108	Numbness	3
Vomiting	67	Chills	2
Constipation	72	Weakness	1
Retraction of head	60	Coma	2
Diarrhea	38	Abdominal distention	7
Headache	33	Pain in abdomen	1
Delirium	15	Jaundice	1
Anorexia	15	Vertigo	2
Irritability	24	Double vision	2
Stupor and restlessness	14	Difficulty or inability to swallow	4
Malaria	9	Difficulty in articulation	2
Nausea	18	Gastro-intestinal upset	2
Convulsions	4	Diaphragmatic breathing	1
Twitchings	3	Coryza	1
Cough	8		

6 cases had skin eruptions.

1 measles and mumps.

1 whooping cough.

1 malaria.

¹ Akute Kinderlähmung und Influenza, Leipzig, 1910.

The occurrence of pain and tenderness is of considerable interest. It is not only an early symptom, but one which frequently persists. In the Massachusetts epidemic it occurred in 420 cases, and was absent in only 82 out of 502 cases in which it was especially observed. The pain or tenderness lasted a varying length of time, sometimes one day, or only a few days, while in many cases it persisted for several weeks, and in a fair number for several months. The duration of the fever varies from one day to as long as six weeks. In the New York epidemic, in 111 cases out of 752 the fever lasted over seven days. As a general rule, the fever lasts two, three, or four days, the range varying between 100° and 106° F., the majority of cases ranging between 101° and 104° F.

Vomiting is present in about 25 per cent. of the cases at the onset, but in quite a number of cases persists for several days.

Various nervous symptoms have been observed, as is well shown in the following table from the New York epidemics (752 cases studied):

	Cases.		Cases.
Headache—frontal	74	Numbness	3
Headache—occipital	26	Stupor	71
Headache—general	62	Rigidity of neck	121
Restlessness	369	Photophobia	26
Delirium	62	Sluggish pupils	5
Twitchings	8	Irregular pupils	1
Convulsions	51	Dysphagia	19
Apathy	294		

SKIN ERUPTIONS. Papular eruptions are most common. In the New York epidemic 61 cases were observed, as is shown in the following table:

	Cases.		Cases.
Erythema occurred in	7	Urticaria in	2
Tache occurred in	2	Sudamina in	8
Macular occurred in	8	Herpes in	2
Maculopapular in	3	Petechial in	2
Papular (apt to be general) in . .	18	Vesicular in	6
Pustular in	3	Once in the mouth.	

PARALYSIS. By far the most important symptom is paralysis, and recent studies have added little if anything to our previous knowledge of the distribution of the paralysis. It may be the first symptom noted, and most usually appears within the first three or four days, although a certain number of cases appear from the fifth to the tenth day, and occasionally it may be two or even three weeks before the paralysis appears.

The paralysis is almost always of a flaccid type, although in the New York epidemic 38 patients had a spastic paralysis which was probably due to some irritation, possibly to the involvement of the meninges. The distribution of the paralysis varies somewhat in different epidemics, as is well shown in the comparison of the following two tables:

MASSACHUSETTS, 1909.

	Cases.
One leg only	192
Both legs only	151
One arm only	32
Both arms only	11
One arm and leg, same side	57
One arm and leg, opposite sides	17
Both legs and one arm	38
Both arms and one leg	6
Both arms and both legs	82
Not stated	12
Back	83
Abdomen	37
Face	8
Right face	16
Left face	10

NEW YORK, 1907.

Parts first affected.	Cases.	Parts first affected.	Cases.
Right leg in	94	Right leg and left arm in	2
Left leg in	155	Left leg and left arm in	5
Both legs in	121	Left leg and right arm in	3
Right arm in	34	Right leg and back in	1
Left arm in	34	Both arms and left leg in	1
Both arms in	15	Face in	7
Right leg and right arm in	2	Neck in	2
Right arm and both legs in	3		

Facial paralysis is sometimes noted; sometimes the eyelids are affected, and strabismus is sometimes present. Swallowing is occasionally interfered with, especially in the bulbar forms of the disease, and in a few cases there is some speech disturbance. Sometimes this is only a change in the character of the voice, while at other times there may be aphonia or aphasia.

The prognosis as regards the paralysis varies considerably, and in the Massachusetts epidemic there was 10 per cent. of complete recoveries, the duration of the paralysis being from three days to twelve weeks.

Vasomotor Disturbances. Various vasomotor disturbances are present in most cases, the affected extremity is usually cold, although in a few they are reported as feeling warm. The skin is most frequently pink in color, although cyanosis is not uncommon. Sometimes there is marked pallor and at other times marked redness. Occasionally there is swelling in connection with the vasomotor disturbances, and this affects chiefly the legs, the swelling usually being about the knee and ankle, or in the feet.

Reflexes. The deep reflexes are absent in the paralyzed part and often in the parts not paralyzed. As far as I know there have been no cases reported in which there have been increased reflexes, and yet I have seen one mild case in which there was some question as to

the diagnosis. There was paralysis of both legs, and the knee jerks were markedly increased. The patient eventually made a complete recovery. In the New York report it was stated that there were 24 cases in which the reflex was present, but no specific statements are made.

Wickman's Classification. In considering the symptomatology, the various forms of the disease are quite important, especially from a standpoint of diagnosis, and while we cannot go into this at this time, it is well to bear in mind the table of the various forms as suggested by Wickman:

1. Spinal poliomyelitic form. Sudden onset followed by paralysis.
2. The ascending form (Landry's paralysis). Involvement of respiratory centres. Most fatal cases belong to this type.
3. The bulbar or pontine form. Nerves most often involved: Facial, ocular, hypoglossal. It may exist alone or with paralysis of the extremities.
4. Encephalitic or cerebral form. It may exist alone or with spinal involvement.
5. The ataxic form. This is much like Friedrich's ataxia.
6. Polyneuritic form.
7. Meningitic form.
8. Abortive form: (1) General infection. (2) Symptoms of meningeal irritation. (3) Cases of much pain like influenza. (4) Cases with marked digestive disturbances.

DIAGNOSIS. The diagnosis is of particular interest in the early cases, and Lucas¹ has made a study of the early symptoms, of the blood, and of the cerebrospinal fluid. The most noteworthy prodromal symptoms are irritability, restlessness, pain in the spine or extremities, and, in some cases, apathy.

From four cases in children, and a number made in monkeys, he finds that, in the acute stage, there is a moderate lymphocytosis, and along with it a marked and constant leukopenia. The normal differential count is about as follows: Polymorphonuclears, 60 per cent.; large and small mononuclears, 25 per cent.; lymphocytes, 12 per cent.; eosinophiles, 3 per cent. In the acute stage: Polymorphonuclears, 40 per cent.; large mononuclears, 15 per cent.; lymphocytes, 40 per cent.; eosinophiles, 5 per cent. These figures represent the normal averages for monkeys with the total number of white cells being 20,000 per cm. This number dropped during the acute stage, the lowest count being 8000 on the day that paralysis was first noted. The spinal fluid was increased, and there was an increase in the number of cells from 100 to 300 per cm. These were chiefly large mononuclears with some polymorphonuclears and lymphocytes. In the prodromal stage

¹ Boston Medical and Surgical Journal, August 11, 1910, p. 245.

there is even more marked increase in the cells. In the early stages the lymphocytes are the predominant form, but, as the cells decrease in number, the polymorphonuclears begin to return and at the end of a week or ten days there are a very few cells present, and these are mostly large mononuclears with a few polymorphonuclears.

These investigations mark an effort to find some means of making a positive diagnosis early in the disease before the paralysis and other destructive changes have occurred, and the hopeful therapy will depend largely upon finding an easy clinical method of doing this, as well as finding some specific treatment.

Müller¹ calls special attention to three early symptoms which he regards as of great importance: (1) The tendency to profuse sweating; (2) hyperesthesia and sensitiveness on movement, and (3) the blood changes as mentioned above.

In some epidemics, digestive disturbances have been very common as an early symptom. Thus, Krause² found that 90 per cent. of 436 cases, occurring near Hagen, Germany, started with some digestive disturbance, and some of them also with disturbances of respiration.

Gay and Lucas³ attempted to find some early signs of value and noted the leukopenia, together with a relative increase in the eosinophiles and lymphocytes.

The Bordet-Gengou phenomenon was negative, a point which has also been called attention to by Wollstein.

After the paralysis has set in, the diagnosis is usually easy, although rheumatism is a frequent diagnosis which in young children should not be the case, as rheumatism with pains in the joints or extremities under five years of age is of extreme rarity. From peripheral neuritis it is probably best distinguished by the sensory disturbances in this latter, and the presence of pain, especially along the nerve trunks.

TREATMENT. No satisfactory method of treatment has as yet been devised. Rest is of very great importance and the patient should have a light, easily digested, nutritious diet, and as much fresh air as possible. If there is much fever, the application of cold is advisable. For the relief of pain and restlessness, one of the most effective measures is to place the child in a warm bath of a temperature of about 100° F., the bath to be at least twelve inches deep. The child may be allowed to stay in this for fifteen minutes, and this may be repeated several times a day. Counterirritation has been used over the spine, but is of doubtful value. The same may be said of the alternate hot and cold applications which have been suggested. Lumbar puncture as a routine method of treatment has not been used in a sufficient number of cases to warrant any statement as to its value, although in some

¹ Münchener medicinische Wochenschrift, November 30, 1909.

² Deutsche medicinische Wochenschrift, October 21, 1909.

³ Archives of Internal Medicine, September, 1910, p. 330.

instances in which it has been tried there has been some relief afforded, but apparently no change in the general outcome of the disease. Sedatives may be used to relieve pain or to quiet irritability as needed. Care should be taken to see that the child is properly cared for, as bed sores are common, and it should be remembered that retention of the urine occurs in some cases, and constipation should be relieved when it exists. Hexamethylenamine has been suggested and should be given during the early stages, the idea being that it exerts an antiseptic effect upon the cord and brain, but in the cases in which I have tried it, which it is true have been few in number, there has been apparently no change in the general course of the disease. It is my custom to advise the use of massage, beginning as soon as the tenderness has disappeared, but avoiding any areas in which the manipulations produce pain or discomfort. Later, electricity and passive movements may be used. Applications of hot and cold water to stimulate the vasomotor system are also advisable, and subsequently orthopedic procedures may be undertaken in suitable cases.

Porocephaliasis in Man. Sambon¹ has made quite an extended review of the porocephalous, or *tongue worm*, and has collected the cases in the literature in which this parasite has been found in man. Porocephalous armilatus is an African parasite found south of the Sahara, and is found in the lungs of the python and puff adders. In the nymph form it has been found in man, and in a large number of wild animals. Sambon discusses the proper classification of this parasite over which there has been a great deal of discussion, and has made a number of personal observations on the presence of the parasite in the animals in the Zoölogical Garden in London.

Rabies. In the series of pamphlets issued by the Council of Defence of Medical Research of the American Medical Association,² there is one by Frothingham recounting something of the history of rabies and investigations made upon it. He calls attention to a fact about which there is considerable misconception, namely, that the presence of Pasteur Institutes for the preventive treatment do not cause rabies unless one should take into account the fact that their presence may, to a certain extent, induce a carelessness in enforcing proper dog laws.

He calls attention, in a very forcible way, to the muzzling of dogs in diminishing the disease, and recites the history of the movement in England which led to the stamping out of the disease in the United Kingdom.

It will be noted that in 1892 there were but 38 rabid dogs in England. At this time the authorities listened to a petition of "dog lovers" and removed the "cruel muzzle," with the result that, during the next five years, 1602 dogs died with the disease, as well as many other animals

¹ Journal of Tropical Medicine and Hygiene, January 15, 1910, p. 17.

² Journal of the American Medical Association, March 5, 1910, p. 782.

and 51 people. Following this, the muzzling law was again enforced and upon a repetition, in 1899, of a dog lovers' movement, backed by a petition signed by 50,000 of them asking that the muzzle be removed, the Government remained firm, with the result that the disease has finally been stamped out and muzzling has been abandoned.

Fig. 5 is so instructive that it is reproduced below:

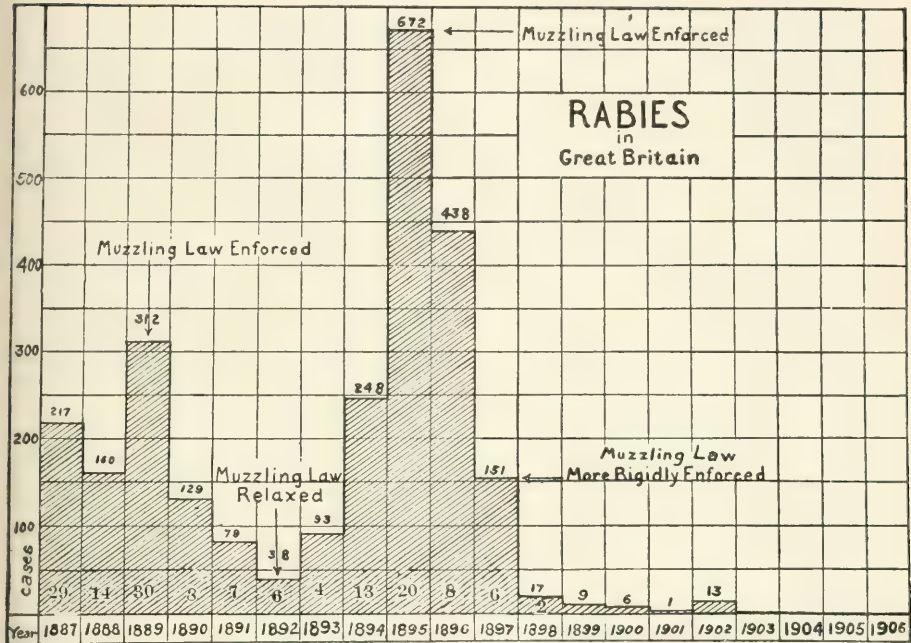


FIG. 5.—Showing relation of enforcement of muzzling law to prevalence of rabies in Great Britain. The figures in the cross-hatching indicate the number of persons who died of rabies in England. Credit for making this chart is largely due to Mr. Aubrey H. Strauss.

Rabies is one of the most curious diseases that we know anything about, and one that has been most thoroughly studied by many competent observers. One of the most interesting of the recent contributions are the observations of Paltauf.¹

Paltauf had an opportunity of making 4 autopsies upon persons who died during the period of treatment by the Pasteur method. The death in each case was due to some intercurrent disease; in 1, apoplexy; in 1, pulmonary embolism; and in 2, delirium tremens. In all 4 cases it was found that emulsions of the medulla injected under the dura of rabbits was capable of producing the disease in these animals, but the virus was evidently very much attenuated since the incubation

¹ Wiener klinische Wochenschrift, 1909, p. 1023.

period was very long and the type of the disease developing in the rabbit was the chronic form.

It would seem that the central nervous system is capable of destroying the virus, and it is probable that, in the cases of people bitten by rabid animals, the reason the disease does not develop in some is that the virus is destroyed in them by the natural defences of the body. It would seem that there is a difference in the virus coming from different animals in regards to its intensity, and it appears that the fixed virus from the rabbit which is used in the treatment is probably the most easily destroyed by the nervous system. There is some question as to whether it will cause the disease in man. Individuals bitten by dogs develop the disease rather frequently, that is, in something less than 10 per cent., while from wolf bites the percentage rises to as high as 60 per cent. Paltauf's experiments show that an individual may have the virus in the brain tissue in an active form for some time and gradually destroy it.

THE WASSERMANN REACTION IN RABIES. It is interesting to note that all observers who have studied the subject of the complement-binding test in rabies have come to the same conclusion, namely, that there seems to be an absence of any specificity for rabies in this test. The subject has been studied by a number of observers, and the last report is that of Berry and Mann.¹

RABIES IN THE PHILIPPINES. Dudley² has made a study of the occurrence of rabies in the Philippines, and since 1907 has found 235 deaths reported from twenty-four different provinces. Largely through his efforts the Pasteur preventive treatment has been undertaken, the virus being kept alive at Manila and forwarded from there to the various parts of the islands to be administered by the local medical practitioners.

The Transmission of Recurrent Fever. Sergeant and Foley³ have made a study of recurrent fever in North Africa, particularly in regard to the transmission of the disease. The spirillum is somewhat larger than that of either the American or European spirillum, and may be inoculated directly from man to monkey (*Macacus sinensis*, *M. cynomolgus*, *M. inuus*, *Cynocephalus sphinx*), but they have been unable to pass it in series from monkey to monkey. Inoculations made directly into rats and mice have only given very slight infections which were cured spontaneously, and sometimes the passage could only be effected with great trouble in newly born mice. Attempts to inoculate all the other animals in the laboratory were without success.

It is interesting to note that the Algerian spirillæ are capable of infecting a monkey who has had the disease previously and has been cured

¹ Journal of Experimental Medicine, May 1, 1910, p. 338.

² Revista Filipina de Medicina y Farmacia, September, 1910, p. 129.

³ Annales de l'Institut Pasteur, May, 1910, p. 337.

of an attack of European recurrent fever. In consequence of this and certain other evidence, the authors are inclined to believe that they have an entirely separate species for which they suggest the name *Spirochaete berbera*. They believe that the disease is transmitted from one patient to another by the ordinary clothes louse (*Pediculus vestimenti*). They were unable, by any experiments which they made, to incriminate either fleas, mosquitoes, or bed-bugs.

The Argus persicus, a sort of spider, which was found in abundance in the houses, also apparently had nothing to do with the transmission of the disease.

Graham U. Smith¹ arrived independently at the same conclusion, and published a small memoir on the subject in 1909. He was able to reproduce the disease by the inoculations of the body of the *Pediculus vestimenti* previously infected with the spirilla.

Injections of Sodium Salicylate in the Treatment of Acute Rheumatism. This method of treatment was suggested in 1902, by Bouchard, and a recent thesis of Paris by R. Rosenthal² gives a resumé of considerable practical experience with this method.

From 1 c.c. to 2 c.c. of a 5 per cent. sterilized solution are injected in the neighborhood of the affected joint. There is a sensation of burning at the site of the injection which disappears after fifteen or twenty minutes, and this may be overcome entirely by the addition of 1 per cent. of cocaine to the solution. Usually one or two injections at the beginning, either of a rheumatic or gonorrheal arthritis, will suffice to allay the suffering, but Rosenthal has used as high as thirty injections, one or two a day in some chronic cases. This method of treatment is practically indicated in cases where only one joint is affected or in individuals in whom sodium salicylate produces gastric disturbances. It is also used in chronic cases because the amount of the drug administered is hardly sufficient to produce changes in the body, and it saves the digestive system from the prolonged administration of large quantities of it. It is contraindicated in the very generalized rheumatism, as the amount of salicylate introduced into the body is not sufficient to affect all of the joints.

Rosenthal did not have any bad effects or accidents from this method of using the drug.

Rickets as an Infectious Disease. Flamini³ has given a resumé of the question of rickets as an infectious disease. This is not a new idea, as even Glisson thought that it was possibly a contagious disease, and many others since that time have believed in the infectious theory of it. Like all diseases in which the pathology is not well understood, there are numerous theories as to its origin. Parot thought it was due

¹ Annales de l'Institut Pasteur, May, 1910, p. 374.

² La Semaine Médicale, June 1, 1910, p. 254.

³ Il Policlinico, Sezione Pratica, May 1, 1910, p. 548.

to syphilis. Others have thought it was due to malaria, to nervous changes, to respiratory troubles; other theories concern the calcium metabolism. Some suggested that there is an excessive excretion of calcium, others, that the ingestion and absorption are deficient. Marfan is of the opinion that changes in the bone are due to toxic substances formed in the intestines of artificially fed babies, and there is a belief that it is due to improper feeding. More recently the various internal secretions have been set down as the cause, such as change in the thyroid, thymus, and others.

Some of the arguments brought forth by those who believe that it is an infectious disease are the geographic distribution of the disease, the history of the invasion of England where it was unknown prior to the beginning of the seventeenth century, and that it started in the western part of England and gradually spread over the entire country.

The disease appears most often in the spring and least frequently in the summer, together with the presence of an enlarged spleen beginning in some cases with fever and other symptoms suggesting an infection.

Chammier¹ is one of the most fervent believers in the infectious theory, and has observed an epidemic of rickets in young pigs in the Department Indre et Loire.

Mirculi claims to have found a coccus somewhat similar to the pus germs in the bones of rachitic children, and Morporgo some ten years ago claims to have found a similar diplococcus in the osteomalacia of white rats. Other Italian observers, Archangeli and Fiocca, claim to have found a similar organism in human osteomalacia, and others claim to have confirmed these results, among whom may be mentioned Artomi Sant' Agnese.² Sorgente, of Rome, claims to have found a similar diplococcus in the cerebrospinal fluid of rachitic children. Artomi made a vaccine of the organism which he isolated from the bones of rachitic children, and cases of rickets treated with this vaccine improved rapidly. He was also able to transmit the disease to white rats, or at any rate, to produce a grave general disturbance in them by injecting cultures of the organisms. These observations are of great interest, but final judgment should be withheld until they have been abundantly confirmed by other observers.

Ringworm. The increase in the number of cases of ringworm in London led to an investigation by a special commission, known as the Lancet Commission.³ As is well known, the disease usually attacks children, and by the time individuals reach twenty, the ringworm, even if not treated, has died out. The infection of adults is not very common.

The disease is most apt to spread among the poorer class of children who are not sufficiently well looked after at home, and is specially

¹ *Études Cliniques sur les Maladies des Enfants*, Paris, 1909.

² *Atti della Società Italiana di ostetricia e ginecologia*, 1909, vol. xv.

³ *Lancet*, January 1, 1910, p. 51.

spread through the medium of schools. Children with ringworm are excluded from the London schools, and they estimate that the disease causes the absence of something like 2950 children. In some sections, private schools have been arranged for children suffering with the disease, but the poorer classes of children are excluded from the benefits of education and seriously handicapped on this account.

At one time, in London, in the East End, there were a considerable number of cases of favus. In 1905, a special school for these children was opened in Whitechapel, where they could be isolated and educated without risk of spreading the disease to others. The school was started with sixty-one pupils. In 1908, an *x*-ray apparatus was installed and for over a year this method was regularly used; at the expiration of that time all except three cases had been cured, and the school was found to be no longer necessary.

The Röntgen rays were apparently of the greatest value in the treatment of ringworm, for while they do not destroy the spores, they cause the hair to fall out, and in most cases, when the hair leaves the follicle it takes the spores along with it and the hair that grows in to replace it does not contain any ringworm spores.

Two methods are used: one is to give repeated small doses until the hair falls out, the other is to give a single dose of sufficient strength to cause the same effect. This latter method has been made possible by Sabouraud, of Paris, who has devised a sensitive disk which undergoes change of color upon exposure to the *x*-ray and, knowing the definite change of color needed to cause the hairs to fall out, the dose may be regulated with great accuracy.

The Commission have investigated the various hospitals which are equipped to do *x*-ray work, and would suggest that the cases be treated by this method. They estimate that there are 5000 cases present, and that 1000 new cases are yearly added to these.

Scarlet Fever. ANOMALOUS SCARLET FEVER. Corlett and Cole¹ have described three epidemics of what they thought was anomalous scarlet fever, the nature of the disease being such that it might have passed unrecognized had there not been one or more typical cases which served as a diagnostic control. Several features were common to all of the epidemics, they were all mild, there being no fatalities in any of them. The onset was sudden in almost all instances and other symptoms were present, usually of a more or less marked character. The temperature varied from normal to 105°, but some of the patients never had a temperature over 99°, and others not over 100°. The symptoms all subsided rather quickly. In only two cases was there an absence of all signs of nephritis; in all the others there was a faint trace of albumin, and in one case there were casts. There was a marked

¹ Journal of the American Medical Association, July 16, 1910, p. 195.

leukocytosis, and, in a few cases in which the differential counts were made, there was a large percentage of eosinophiles. The erythema was the most interesting feature. In 1 case, it was absent altogether; in another, it was confined to small areas and very evanescent; 2 of the patients with a slight erythema had it confined to the neck, shoulders, and arms, and in one instance there was a secondary erythema. In 3 other instances, the erythema was very light. In all three epidemics there were 32 cases.

This article is of interest in order to keep alive the knowledge of the fact that scarlet fever may exist as a very mild disease and that from these mild cases severe infections may occur, although Corlett and Cole did not note any such in their epidemics. Atypical cases are very commonly seen in the midst of severe epidemics, especially in institutions for children, where, during an outbreak of scarlet fever, the throats and skin of all the children are carefully scrutinized and the temperatures taken; cases that would otherwise pass unrecognized, may be discovered.

Corlett and Cole have gone into the literature on the subject, beginning with the observation of Trousseau, in 1828, of a case of scarlet fever without eruption, and they have quoted from numerous other authorities down to the present time.

POSTSCARLATINAL ERYTHEMA. Some years ago Heubner reported a case of a young girl, who, fifteen days after the appearance of scarlet fever, was taken with slight pains in the joints and a cutaneous eruption which ended in gangrene.

Schick¹ has reported 5 somewhat similar cases of postscarlatinal erythema coming on usually after some simple traumatism, such as scratching. The eruption was first punctiform, and then had the appearance of dark macular papules. These increased in size in an irregular manner, and the centres became pale. In general, the appearance was that of a geographical map. In some, there were the formation of vesicles which upon drying produced crusts. The eruption was symmetrical, always appearing on the opposite side of the body within twenty-four hours. It was most marked upon the extensor surfaces of the elbows and thighs, and about the ankles, in other words, the parts of the body most exposed to pressure. There was high fever and intense pain in the joints; 3 of the patients died; the fourth left the hospital in a desperate condition.

POSTSCARLATINAL ANURIA. Northrup² has reported an instance of anuria lasting five days in a boy, aged three and a half years, beginning on the twelfth day. The scarlet fever had come on with a marked angina, and 5000 units of diphtheria antitoxin had been given. During this period no urine was passed, and there was none in the bladder.

¹ Jahrbuch für Kinderheilkunde, 1910, lxxi.

² Medical Record, October 22, 1910, p. 706.

On the fourth day, the edema became very marked, the eyes were almost closed, and the body badly swollen. There were no symptoms of uremia, no nervous signs, no headache, and no vomiting. On the fifth day, the edema became even more marked, and on the afternoon of the fifth day of the period of anuria the patient passed about 40 c.c. of urine and large amounts on the subsequent days, and made a perfectly good recovery. Owing to the circumstances attending the case, there can be no doubt that there was absolutely no urine passed for the period mentioned. There are on record other cases, one of eight days and one of twenty-five days, but these cases are perhaps not absolutely free from doubt.

THE SERUM TREATMENT IN SCARLET FEVER. Jochmann and Michaelis¹ have reported their results in the use of various serums in the treatment of scarlet fever. They do not believe that the streptococcus is the cause of the disease because they have been unable to find the streptococcus in patients dying in the first day or two of the disease, although after this time it is constantly found. In previous years they have tried Marmorek's antistreptococcus serum, and also Aronson's, but were unable to obtain any satisfactory results. They tried von Leyden's, also without any satisfactory results.

Cases treated with the *streptococcus vaccines* were apparently not benefited in any way. They then tried an *antistreptococcic serum* as suggested by Meyer and Ruppel. This was made by immunizing horses with the streptococcus obtained from the corpse of a patient that had died from scarlet fever. The antitoxic value of this serum was tried upon mice. It was found that the serum could be preserved perfectly for four or five months, after that time it becomes weaker, and after seven months should not be used. The results with this serum used alone were not particularly encouraging, and the third method of treatment was then tried, consisting of the use of the *streptococcus vaccines and of the serum*, given either subcutaneously, or, in the very serious cases, intravenously. The results obtained from this method were by no means constant, yet taken all in all, Jochmann, who has had a very large experience with scarlet fever epidemics, believes that this method holds out greater promise of usefulness than any that has been heretofore suggested in scarlet fever. The septic cases that had gone on for about a week and had necrosis of the pharynx, involvement of the glands of the neck, and a general streptococcus infection, could not be saved. In the milder grades of infection and sepsis, some were apparently greatly benefited. The very severe toxic cases, with intense symptoms in the first few days, were also apparently not influenced by this treatment. The cases in which this method acted most favorably were those in which there was beginning necrosis

¹ Berliner klinische Wochenschrift, May 16, 1910, p. 921.

of the tonsils, and in which there was not yet any very great amount of general poisoning by the streptococcus. This method is worthy of a further trial in just this class of cases, as one would not expect it to affect either the very early malignant cases, nor those in which there is streptococcus septicemia.

Sleeping Sickness. A preliminary paper has been issued by the British Government on the subject of sleeping sickness. This article is by Sir Henry Hesketh Bell, late Governor of the Uganda Protectorate, and now High Commissioner of northern Nigeria.

This paper is reviewed in the *Lancet* (January 22, 1910, p. 263), and deals with the history of the disease, and with the various measures that have been taken from time to time to eradicate it.

Prior to the outbreak of the disease in the Uganda, the tsetse flies were quite as abundant as they are now, but no ill effects seemed to attend their bites. From a practical standpoint the disease is almost always transmitted from a person suffering with it to a healthy one by the bite of this fly. In some cases, it seems that the disease may be transmitted from an infected animal, but this feature can apparently be disregarded, as the danger is very slight. The presence of a single person affected with the disease may, in a locality where there are tsetse flies, lead to the infection of the entire community. There are no authenticated cases in which the disease has been transmitted from sick persons to healthy ones in districts where the tsetse fly is not present. The fly is usually found in the neighborhood of fresh water, especially where it is surrounded by a great deal of vegetation and where the shade is thick. When such vegetation is cleared away, the flies usually abandon the locality.

There are two methods which may be used to avoid infection: One is to exterminate the flies, and the other is to move all infected persons from the fly-infested areas. The flies are present in such large numbers along the banks of the lakes and of the larger rivers that the extermination of them seems to be, for the Uganda at least, an impossibility. Under Bell's regime, specially organized camps were formed in fly-free areas, and all infected persons were removed to these camps and placed under the care of medical officers. Following the removal of the sick persons, there was a temporary removal of all the healthy persons from the areas infested by the flies so as to allow sufficient time to elapse for the disease to die out in the fly, the fly being able to retain the power of infection for a limited period only. Special efforts were also made to eliminate the flies from the localities in which the population could not be removed, and also in places through which travellers were obliged to pass. It was estimated that, between 1898 and 1906, more than 200,000 people died from the disease. In 1907, the deaths were about 5000; in 1908, 3662; while for the first half of 1909 the returns from Uganda showed a mortality of only 459.

Bell is of the opinion that, as used at present, neither atoxyl nor mercury have any curative effect upon the disease, although he states that they seem to have prolonged the lives of the patients and to some extent have reduced the acuteness of their suffering. Other observers have claimed that, if given sufficiently early, a certain number of cases yield to the treatment by the use of atoxyl. The report also deals with the period of infectivity of the tsetse fly which was noted in *PROGRESSIVE MEDICINE* for 1909.

A rather ingenious method for suppressing the sleeping sickness in the Island of Principe, is given in the report of the Portuguese Commission¹ in the January Bulletin of the Sleeping Sickness Bureau. This method was introduced by Maldonado, manager of one of the estates, who noted that the tsetse fly settled upon the backs of the laborers working in stooping position. These flies are known to have a preference for black surfaces, and Maldonado had his laborers wear on their backs a piece of black cloth coated with a glutinous substance upon which the fly became imprisoned. Over one hundred thousand flies were thus trapped and destroyed, and it was found that two laborers sufficed to rid a plantation of most of the flies in a short time. This method was adopted by other plantations, and during the first few days of its use from 1500 to 2000 flies were captured. Later, the number fell to 15 or 20 and there was a comparative absence of these flies noted.

This method, to be successful, would only be applicable to comparatively small islands which were fairly well under cultivation, and where flies could not be introduced from abroad.

TREATMENT OF SLEEPING SICKNESS. While full reports are not at hand it is believed that Ehrlich and Hata's dioxydiamidoarsenobenzol will prove efficacious in the treatment of this disease and results will be awaited with unusual interest.

EXCESSIVE LIABILITY OF EUROPEAN WOMEN IN AFRICA TO SLEEPING SICKNESS. Manson,² has called attention to the very important fact that European women are apparently very susceptible to sleeping sickness. While he has no accurate figures, he believes that the proportion of European women to men in tropical Africa is about 5 per cent. If there is an error in this estimate, the number of women is overestimated. In 14 cases of sleeping sickness in Africa with which Manson came in contact, 5 were females, and if the susceptibility of the sexes were equal he would have expected to have encountered at least 95 males. In most of the cases, the infection was from the bite of a fly on the leg, and Manson suggests that Europeans, travelling in the districts in which the tsetse fly is found, discard their present style of garment and wear a bloomer costume or loose trousers secured

¹ *Lancet*, February 12, 1910, p. 446.

² *British Medical Journal*, January 8, 1910, p. 72

above the top of the boots. He suggests that men, too, should wear clothing furnishing adequate protection, especially for the legs.

Smallpox. BANDAGES OF PERMANGANATE OF POTASH IN THE TREATMENT OF SMALLPOX. The good effects of treating smallpox by red light is very well known, but its practical application is rather difficult owing chiefly to the trouble experienced in ventilation. To overcome this, Dreyer¹ has used, for some eight years, bandages saturated with the solution of permanganate of potash.

The patient is covered with the bandage wherever there is any eruption, particularly the face and arms, and during the first day or two the bandage is changed three or four times to obtain a sufficiently intense discoloration. After that the bandage is changed once a day. This has the same action as the red light in reducing the amount of suppuration, and the further advantage of preventing the decomposition of the pus and lessening the disagreeable odor.

The results obtained by Dreyer were exceedingly satisfactory, but it has been suggested that patients suffering with weak hearts, either the result of previous disease or acquired as the result of smallpox, should have the potassium solutions used with great care, for if it is absorbed, it causes considerable cardiac depression. It is possible that this might be avoided by substituting sodium permanganate in place of potassium permanganate.

THE USE OF RED LIGHT IN SMALLPOX. Würtzen² calls attention to several practical points in the use of red lights in smallpox hospitals. There seems to be no question about the fact that patients kept in a red light have less difficulty, especially with the skin eruption, than those treated in ordinary daylight. Red light is best obtained by using red glass. The use of red flannel, or other red cloth, may be substituted if red glass cannot be obtained. The glass used should be tested with a spectroscope to see that it does not admit of the passage of green rays, as much of the red glass on the market deteriorates rapidly and is not very effective. The color of the glass to the naked eye is apparently a very poor test and should give way to the spectroscope.

Würtzen also calls attention to the fact that daylight should not be allowed to enter from adjoining passages. All sources of artificial light must be covered with red glass such as photographers use, and if ordinary light is needed he recommends the flame of a tallow candle, the flame of which contains so few chemical rays as to be of little harm.

The experience in Copenhagen was that the light did not produce unpleasant effects in the long run, although some patients developed a great aversion to it. It often produces a feeling of heaviness and headache, and reading by it is exceedingly tiring. It causes hypersensitiveness of the eyes of the nurses who are obliged to go backward

¹ La Semaine Médicale, August 10, 1910, p. 383.

² British Medical Journal, August 6, 1910, p. 310.

and forward between the red room and the light, but this can be lessened very greatly by the use of variously colored glasses, according to the individual preference, red or blue being most commonly chosen. These glasses do not cause any considerable weakening of the light in the red room, contrary to what might be expected.

Sporotrichosis. A résumé of the knowledge of the subject of the cutaneous infection by means of the sporotrichum has been published by Bloch.¹ This fungus was described in man, in 1903, by de Beurmann.

Bloch has collected about 75 cases, and notes that sporotrichosis affects various animals and almost any of their organs. The serum of the patients agglutinates suspensions of pulverized cultures of the fungus, and Bloch obtained a marked cutaneous reaction along lines similar to the von Pirquet method.

The disease in man is usually in the skin. It is most liable to be mistaken for syphilitic and tuberculous lesions. In a few instances the throat, larynx, and lungs, have been involved, and sometimes the bones and joints. The disease may produce a cachectic condition and cause death.

Sutton² has reported a case of this disease, of which some dozen cases have been reported in America since Schenck's article, in 1898. It is very probable that a large number of cases are overlooked, owing to the average practitioner being unfamiliar with the disease.

As a rule, the sporothrix enters through a wound in the skin, but this is not absolutely necessary. An infection may apparently take place through the tonsils, or in other ways. In most instances, the infection has been upon the hand, or forearm, or on the foot, leg, or thigh.

In Sutton's case, which may serve as a clinical example, the first phalanx of the thumb of the right hand was considerably swollen. On its palmar surface there was a well-defined oval ulcer with a rough, bright red, granulating base. The edge of the ulcer was undermined, and there was an abundance of grayish, tenacious pus. There were two excoriated papules, one on either side of the thumb, and there was a hard nodule the size of a pea over the wrist giving rise to no symptoms and to no discoloration of the skin. Just below the elbow there was a larger swelling about 2 cm. in diameter. This was purple in color, soft and compressible, and further up the arm were four more nodules. There was no enlargement of the epitrochlear or axillary glands, and the signs which commonly mark the presence of an ascending cellulitis were absent. The temperature was normal, and the patient suffered no discomfort from the lesions.

Diagnosis was made by incision of the largest nodule under the usual precautions and inoculating agar and glycerin agar tubes with the

¹ Beiheft zur Medicinische Klinik, Vienna and Berlin, 1910, p. 179.

² Journal of the American Medical Association, September 17, 1910, p. 1000.

thick mahogany colored pus. These were incubated at 37° C. and four days later the growth of the sporothrix had developed. Iodide of potassium is almost a specific in this disease, and when given in full doses usually causes a disappearance of the lesions.

The Serodiagnosis of Sporotrichosis and of Actinomycosis. Widal, Abrami, Joltrain, Brissaud, and Weill¹ have made some very important studies on the diagnosis of sporotrichosis. Two methods may be used. The agglutination test, and a test based on the Bordet-Gengou phenomenon, similar to the Neisser-Bruck-Wassermann reaction. The agglutination test is difficult, owing to the technique which is necessary. The spores of the *Sporotrichum Beurmanni* represent the agglutinable element of the parasite, and they have suggested the name of sporo-agglutination in connection with this test. Without going into the technical side of the question, it may be stated that the agglutination is observed in cases of sporotrichosis, but is not noted in ringworm, favus, tinea versicolor, and aspergillus infections.

A point of very great importance is that the spores of the sporotrichum are agglutinated by the blood serum from cases of thrush and of actinomycosis, and this is of particular importance in the latter disease, as the agglutinating phenomenon cannot be applied to the actinomyces, and this permits of a diagnosis in cases of visceral lesions which heretofore have been impossible to determine. The same is true of the fixation test.

Tabardillo (Mexican Typhus). Ricketts and Wilder² have reported other observations relating to Mexican typhus.

Anderson and Goldberger³ were able to transmit the typhus fever of Mexico to the macacus and to the capuchin monkeys by direct inoculation of virulent human blood, and this experiment, taken in connection with Nicolle's failure to infect the monkey by direct injections of the human blood of patients suffering from European typhus, led the above-mentioned authors to question the identity of the two diseases.

In children, the two diseases resemble each other clinically quite closely; but in adults, the onset and the defervescence of the Mexican disease is much slower than that of the European variety. Ricketts and Wilder were able to confirm the results of Anderson and Goldberger.

It would seem that the serum is infective, as well as the defibrinated blood, and dilutions of the serum with salt solution seem to favor the transmission of the disease. The virus will not pass through a small Berkefeld filter, at any rate not in sufficient quantities to allow the transmission of the disease.

The most interesting experiments deal with the transmission of the

¹ Annales de l'Institut Pasteur, January, 1910, p. 1.

² Journal of the American Medical Association, February 5, 1910, p. 463, and April 23, 1910, p. 1373.

³ Public Health Reports, December 24, 1909.

disease by the body louse (*Pediculus vestimenti*). They were able to transmit the disease from man to monkey, and also from monkey to monkey, by means of lice, and another monkey was infected by the introduction of the abdominal contents of infected lice into small incisions. Attempts made to maintain typhus in the monkey by passage through other monkeys were not successful. Sometimes the monkey will pass through typhus of so mild a character that it cannot be recognized clinically, although it produces an immunity.

In a later communication, the same authors¹ detail their experiments regarding the possibilities of the hereditary transmission of the infectivity of the louse, and they have proved that the lice hatched from eggs of infected lice were capable of transmitting the disease to monkeys. They also made further experiments regarding the possibility of the flea and bed-bug carrying the disease, and in both instances were unable to reproduce the disease with either insect, thus bearing out their earlier impressions regarding the method of transmission of Mexican typhus.

THE RELATION OF TABARDILLO (MEXICAN TYPHUS) TO ROCKY MOUNTAIN SPOTTED FEVER. Ricketts and Wilder² have made a comparison of two diseases which have a number of points of similarity, that is, the typhus fever of Mexico, or tabardillo, and Rocky Mountain spotted fever.

The eruption in both diseases is somewhat similar, coming on in typhus in about five days after the beginning of the fever, and in spotted fever, from the second to fifth day. There is a tendency, in both diseases, to small hemorrhages in the skin, and these appear with greater regularity in tabardillo, although there are great variations in both diseases. In spotted fever, the eruption first appears on the forearm and lower leg in a large percentage of cases, while in typhus, it is first seen on the abdomen and sides of the chest. The distribution in the end is a very general one in both diseases. Gangrene is more common in the spotted fever of Idaho, involving usually the foreskin, the scrotum, the tonsils, and faucial pillars, while in typhus there is occasional gangrene, especially of the toes, feet, and lower leg. The spleen in spotted fever is always enlarged, sometimes being very large, while in Mexican typhus the enlargement is slight, rarely sufficient to be detected clinically. The lymph nodes are also larger in spotted fever. These differences are all more or less of a minor nature, and there appears to be nothing unique as far as the anatomical changes go in either disease. Clinically, one of the marked differences between the two diseases is in the temperature curve. In typhus, the fever begins and ends rather abruptly, while the temperature in spotted fever may not reach its maximum until a week or more after the onset, and defervescence may occupy a week or ten days. There is usually a crisis in typhus, coming on

¹ Journal of the American Medical Association, July 23, 1910, p. 309.

² Archives of Internal Medicine, April, 1910, p. 361.

from the tenth to the fourteenth day, while in spotted fever patients are rarely convalescent until the end of the third week, and may remain bedfast for from four to six weeks.

Both infections are general, involving the blood and presumably the lymph, and both are also without the critical involvement of any particular organ. The blood from spotted fever is always infective for the guinea-pig, monkey, and certain other animals, and Nicolle has recently reproduced European typhus in chimpanzees, while Ricketts, Wilder, Anderson, and Goldberger have been able to do the same thing with Mexican typhus.

The transmission of the two diseases is apparently by insects, the spotted fever being transmitted by certain species of ticks, while the Mexican typhus is presumably transmitted by the body louse. The same insect is probably responsible for the transmission of the European typhus, according to the experiments of Nicolle.

There is a striking difference in the susceptibility of animals to the two diseases. Mexican typhus will not infect guinea-pigs, rabbits, white rats, and mice, while spotted fever may invariably be transmitted to the guinea-pig by the use of the proper technique.

One attack of either disease renders the individual immune to further attacks of the same disease. The serum of the typhus convalescents, drawn within a week to ten days after the fever has disappeared, exerts no more protective effect against spotted fever than normal serum does, and such serums show little or no more agglutinating effect for the bacilli which appear to be associated with spotted fever than do normal serums. A monkey which had been rendered immune to typhus was not immune to spotted fever.

The authors conclude that, while the two diseases are probably closely related, they are not identical.

The Dwarf Tapeworm. In 1903, Stiles predicted that the dwarf tapeworm (*Hymenolepis nana*) would prove one of the most common of the American intestinal parasites. This worm was described fully and a review of the literature given by Ransome.¹

Schloss² has reported 20 cases seen over a period of eighteen months. The worm is present in great numbers in infected cases, from 50 to over 2000 parasites being passed after treatment. This parasite is the smallest tapeworm known in man, and measures from 5 to 45 mm. in length, and varies in width from 0.5 to 0.9 mm. at its greatest width, and is composed of from 100 to 200 small segments. The eggs have two distinct membranes, and measure from 30 to 60 μ in diameter. There is a very similar tapeworm, possibly identical with this, which develops in rats without any intermediate host. The eggs are passed

¹ Bulletin 18, Hygienic Laboratory, United States Public Health and Marine Hospital Service.

² Journal of the American Medical Association, April 9, 1910, p. 1206.

with the feces, and when swallowed, the embryo attaches itself to the intestine where the further development takes place. The children infected with this tapeworm have comparatively few symptoms. They may, however, suffer from a train of indefinite symptoms which are probably due to the toxin produced by the worm. There may be more or less restlessness, and sleep is disturbed. There may be nervous symptoms of various kinds, and a more or less marked anemia. Occasionally, the worm gives rise to more severe symptoms, but in the majority of cases there are no symptoms whatever, and the parasite is usually discovered accidentally. The male fern is the only remedy that appears to be of any use.

Bass and Gage¹ also wish to emphasize the possible frequency of the dwarf tapeworm, and have found 15 cases; 5 of them were discovered while making a routine examination of the stools of 315 students of Tulane University; 2 of them had never had any noticeable symptoms; the other 3 had had severe symptoms several years previously, and 2 of these had had convulsions from three to five years before, and still had some mild symptoms.

Tetanus. **FOURTH OF JULY TETANUS.** The eighth annual summary² of the Fourth of July injuries shows that there were 72 cases, or the lowest number reported since the statistics have been gathered. Last year there were 150 cases. The number of blank cartridge wounds shows a correspondingly large decrease from 1225 last year to 450 this year. The blank cartridge is the most common cause of Fourth of July tetanus, the injury in most cases being in the hand. Of the 72 cases, all were males except one, and all but 6 were under eighteen years of age; the youngest was six years old, and the oldest fifty-six years, while the average age was thirteen and a half years.

The symptoms appeared in from three to ten days after the injury, and for the fatal cases the average was six and a half days. When the incubation is longer, it probably indicates a milder form of infection, with a better chance for recovery. Death took place in from one to eight days after the appearance of the symptoms, the average being two and three-quarter days. In 6 cases, death took place in five days or less after inoculation. Antitoxin was used in 25 cases, but in only one instance before active symptoms had set in.

The blank cartridge was responsible for 88.9 per cent., 5 cases being due to gunshot wounds, 2 to injuries by fire-crackers, and 1 was caused by a dynamite cap. There were 47 cases of lock-jaw reported during the Fourth of July season due to injuries other than fire-works. The decrease in deaths has been largely due to common-sense methods of restricting Fourth of July celebration, and in the cities with sufficient

¹ New York Medical Journal, October 15, 1910, p. 769.

² Journal of the American Medical Association, September 3, 1910, p. 863.

prohibitive ordinances there was almost always a comparatively clean record. Baltimore, Washington, and Cleveland being examples of towns in which the efficient action of the police has caused a complete disappearance of Fourth of July tetanus.

LOCALIZED TETANUS. Esau¹ has reported an interesting case of localized tetanus in a boy, aged fourteen years, which developed some six days after a local injury. This lasted for about a week, and then there was a general tetanus from which the patient finally made a good recovery.

Localized tetanus is of very rare occurrence. Axhausen was able to collect but 10 cases, after going over the literature very thoroughly. Jacobsen and Pease, in 203 cases, observed 10 of localized tetanus, but there was some doubt about all except 2 of these. A third case was reported last year by Pochhammer.²

The diagnosis is difficult until the symptoms become general. The clinical picture is no way characteristic. The prognosis, as a rule, is good. The cases reported are of less virulence than those in which the general onset has been sudden.

THE TREATMENT OF TETANUS. There are a number of different methods of treating tetanus, which, of course, argues that the right method has not yet been discovered, and among these is the use of *subcutaneous injections of magnesium sulphate*.

In 1905, Meltzer showed that paralysis of the nervous tissue could be induced by magnesium salts, and following this announcement the drug has been used with rather satisfactory results in a number of cases of tetanus. In the majority of the recorded cases the magnesium sulphate has been used in solution injected into the subarachnoid space, while in some, the drug has been introduced into the subcutaneous tissues. The only use of this method of treatment is that it controls the spasms and so saves the patient's strength and gives him time to form his own antitoxin.

Among the cases which have been reported is one by Paterson.³ The patient was a coal miner, aged twenty-one years, who was admitted to the hospital three weeks after he had received a small wound on the scalp from a kick. The symptoms had commenced six days before admission, and at the time of his entrance into the hospital he had a marked case of tetanus. On the following day he was given 10 c.c. of a 10 per cent. sterilized solution of magnesium sulphate, 5 c.c. being introduced into each thigh. These injections were repeated every four hours night and day for two days, and although they were very painful, the patient frequently cried for them on account of the relief obtained. After two days the painful spasms had almost entirely

¹ Deutsche medicinische Wochenschrift, April 14, 1910, p. 707.

² Volkmann's Vorträge, 1909, No. 520.

³ Lancet, April 2, 1910, p. 922.

disappeared and the general convulsions had become less frequent, but were still very severe, so that the dose of the magnesium sulphate was increased to 20 c.c. This was given every four hours and continued for four days. The day after the treatment was stopped there was an erythematous rash over his shoulders and this gradually spread until, several days later, the greater part of his body was covered; it then began to fade, and at the end of a week had disappeared. The patient left the hospital five weeks after admission.

Wassermann, Babes, and Kowalski have used frequent repeated subcutaneous injections of emulsions of rabbit's brain in normal salt solution, and it is supposed that this fresh nervous matter combines with the tetanus toxin circulating in the blood and thus prevents its absorption by the nervous system of the patient, and Paterson suggests that a combination of this with the magnesium sulphate would give satisfactory results.

BACCELLI'S METHOD OF TREATMENT OF TETANUS. Lopi¹ had occasion to use Baccelli's method in a case occurring in a patient aged twenty-five years, following a crushing of the right hand, the disease having appeared on the ninth day after the injury. Antitetanus serum was given subcutaneously, 40 c.c. per day for four days, without any improvement. It was impossible, on account of the opisthotonos, to penetrate into the spinal canal, so that that method had to be abandoned. On the seventh day after the beginning of the disease 10 c.c. of Baccelli's solution of carbolic acid was injected subcutaneously under the skin of the abdomen. Two days later the opisthotonos contractures began to disappear, and the patient finally made a complete recovery. In addition to the carbolic acid solution which was injected for several days, chloral and morphine were also used.

Lupi² has also reported a case which was cured by using Baccelli's solution. This solution consists of a 2 per cent. carbolic acid solution which Baccelli recommends in daily doses not exceeding 30 to 50 cg. to start with, and gradually increasing the dose until a gram is given.

Lupi commenced with 1 gram doses and continued them for ten days.

Phillips³ began the treatment of a case which was cured with 1 c.c. of a 4 per cent. solution, and later the same patient was given injections of 5 per cent. solutions. Three to five injections were given a day and, during the thirty days that he was treated, 103 injections were given without the slightest sign of any poisonous symptoms from the carbolic acid.

¹ Gazette des Hôpitaux, September 20, 1910, p. 1469.

² La Liguria Medica, December 15, 1909, and Il Policlinico, Sezione Practica, January 9, 1910, p. 53.

³ British Medical Journal, December 11, 1909.

Transmission of African Tick Fever. Leishman¹ has been carrying on some elaborate experiments in regard to the transmission of the spirochete. Dutton and he are of the opinion that it is of protozoal origin. He has confirmed many of the main facts in connection with tick fever, has reproduced the disease in monkeys from infected ticks sent from Africa, and has also confirmed the hereditary transmission of the disease to the second generation of ticks. Moeller has observed the transmission of the virus to the third generation, which Leishman hopes also to do at the time of his report if the ticks are sufficiently old to take up this point.

Koch has found the spirochete in the tick, in the eggs, and in the young hatched from the eggs, but Leishman was unable to find the spirochete in the tick, but observed large numbers of chromatin granules which he believed to be derived from the spirochete, which undergo division and which he believes may give rise to the disease. He was able to produce the disease in mice by injecting an emulsion of the various organs of the tick containing these granules, the emulsion apparently being free from spirochetes. The incubation period in these experiments corresponded to the usual incubation period for a natural infection by the tick bite, and numerous spirochetes were found in the blood of the mice having the disease.

Trachoma. Edwards² succeeded in cultivating a new organism from a case of trachoma. This was grown on 5 per cent. peptone alkaline agar over which a drop of fresh blood from the ear of the patient, from whom the culture was made, was smeared.

The organism is a small, polymorphous bacillus, about $1\ \mu$ in length; neither spores nor granules are made out. It is non-motile, and stains poorly with methylene blue, but well with carbolfuchsin and also with the Giemsa stain. It grows slowly on 5 per cent. peptone alkaline agar, blood smeared, in small white colonies which become visible to the naked eye on the second day, and reach their maximum size in five or six days. No positive results were obtained by animal inoculation, but it was impossible to obtain the higher apes for this purpose.

Edwards has published his brief report with the hope that others may either confirm or discredit his observation which was made in the laboratory of the Bureau of Science at Manila.

Trichinosis. W. Gilman Thompson³ has made a clinical study of 52 sporadic cases observed in his own personal practice, and in the service of colleagues and himself in the Presbyterian and Bellevue Hospitals. He calls attention to the fact that trichinosis, at least in the vicinity of New York, is much more common as a sporadic disease than is usually supposed. Very little attention is paid to trichinosis

¹ Lancet, January 1, 1910, p. 11.

² Journal of the American Medical Association, March 19, 1910, p. 965.

³ American Journal of the Medical Sciences, August, 1910, p. 157.

in the inspection of meat, and the dietetic habits of the immigrants are such as to render them liable to infection. In many of the cases the diagnosis is not made, but there should be no difficulty in regard to this if one will bear in mind the following symptoms:

The disease usually has an acute onset, with vomiting and abdominal cramps. There is always a high grade of eosinophilia present, usually above 30 per cent. and frequently much higher, even above 80 per cent. The temperature is high, often reaching 104° or more, and lasting in a lessening degree for from two to six weeks. In about one-fourth of the cases there is puffiness of the eyelids and face with pain in the eyes, and in some cases there may be edema, in other parts of the body. Dyspnea and diaphragmatic breathing without cyanosis has been noted in about one-fourth of the cases. There are usually generalized muscle pains, cramps, soreness, and prostration. There is sometimes an apparent immobility which may lead to mistakes in diagnosis, and lastly, the sudden occurrence of symmetrical, circumscribed, corneal hemorrhages in a patient whose bloodvessels are not degenerated should give rise to a suspicion of trichinosis.

Albert¹ has described an epidemic of 14 cases, due to eating boiled ham, which occurred in October, 1907, at Grinnell, Iowa. He also calls attention to the fact mentioned above, that trichinosis is of probably more frequent occurrence than is generally supposed. He also calls attention to the value of eosinophilia diagnosis. The chief value of his paper is that he believes that all pork consumed in any other form than boiled ham should have all parts of it raised to the boiling point, and he believes that the temperature of 170° to 200° F. maintained from one to six or more hours will destroy the trichinæ in hams in the vast majority of cases.

TRICHINOSIS AND EXAMINATION OF THE BLOOD. It has generally been accepted that the *trichinella spiralis* passes from the intestines to the muscles by way of the chyle and the bloodvessels.

In 1909, Herrick and Janeway, of New York, demonstrated the *trichinella* in the circulating blood in man.

Packard² has made a second observation of the same nature, having found the organism in the blood by using Stäubli's method, which consists in taking the blood by means of a 3 per cent. acetic acid solution, centrifuging and examining the sediment. In Packard's case, the organism was discovered on the twenty-second day after the patient was first taken ill. Stäubli, by means of this method, succeeded in demonstrating the embryos in the blood of a guinea-pig.

Cross³ has made a very interesting observation, and reports the finding of the *trichinellæ* in the blood drawn from the patient's ear. In this

¹ American Journal of the Medical Sciences, August, 1910, p. 167.

² Journal of the American Medical Association, April 16, 1910, p. 1297.

³ Archives of Internal Medicine, September, 1910, p. 301.

instance, the blood was taken on the eighth day after the first clinical symptoms.

Trichocephalus Enteritis. Cade and Garin¹ have made a study of this condition, of which there are some scattered examples in the medical literature, and they believe that the disease presents itself under various aspects; one form is a diarrhea characterized by frequent attacks of colic and tenesmus which resists ordinary methods of treatment. In some cases, the clinical picture is almost that of dysentery. In other cases of the disease, there are attacks of constipation alternating with diarrhea, the clinical picture resembling closely membranous colitis. In addition there are numerous nervous manifestations and sometimes more or less fever.

Diagnosis was made by finding the parasites in the stools. The prognosis must be guarded, as relapses are not infrequent. Two remedies have been recommended highly, the ethereal extract of male fern, and thymol. This last remedy may be given in doses of 1 gram, repeated three times a day for three or four days, and followed by a saline purge. During this cure, the patient should take neither alcohol nor any alcoholic drinks, and no oil.

Trypanosomiasis. Chagas² has described a new form of trypanosome which he has named *Schizotrypanum cruzi*. This parasite was discovered in a large biting bug known as "barbeiro," which appears in the hovels of the poor working classes, coming out at night and biting chiefly on the exposed parts of the body. The result of the trypanosome infection which chiefly affects children is extreme anemia, edema, enlargement of the lymph nodes, thyroid, and spleen, functional disturbances, especially of the nervous system, and frequent mental degeneration.

Tuberculosis. The amount of work which is being done upon the subject of tuberculosis is really remarkable. In many instances it is the outcome of special endowments for that purpose, or else is work done in connection with the various tuberculosis institutes.

Of particular interest are the newer methods of examination for the tubercle bacillus, the use of the x-rays in diagnosis, and some of the other newer diagnostic methods. A great deal has been added to our knowledge of the symptomatology and clinical history of unusual forms of tuberculosis, and there is no doubt but that a great deal more will be found out about this disease, concerning which we are beginning to have a large number of definite facts.

NEW METHODS OF EXAMINING FOR THE TUBERCLE BACILLI. J. A. Finkelstein³ recounts his experience with some of the new methods

¹ Livre Jubilaire du Professeur J. Teissler, 1910.

² Brazil Medico, May 1, 1910; Journal of the American Medical Association, August 13, 1910, p. 603.

³ Berliner klinische Wochenschrift, June 6, 1910, p. 1059.

employed in examining for the tubercle bacillus. One of the most important advances that has been made recently is the discovery of Gasis, that the tubercle bacillus is not only acid-fast and alcohol-fast, but that it is also alkali-fast, and that all the other bacilli similar in appearance to the tubercle bacilli are decolorized by alkalies. Finkelstein has confirmed Gasis' observation and has found this method to be a reliable way of distinguishing the tubercle bacilli from the smegma bacillus, and from the other acid- and alcohol-fast organisms.

Another method, which has contributed largely to the accuracy of bacteriological diagnosis in regard to tuberculosis, is the discovery of Uhlenhuth. There has been for some years an attempt made to find some method of dissolving the various albuminous and other material in the sputum, and other discharges from the body, so that the tubercle bacillus could be separated by the use of the centrifugal machine. Uhlenhuth uses what he calls antiformin, which consists of a mixture of Javelle water and sodium hydroxide (10 per cent. solution of hydrochloride of soda with 0.5 per cent. of sodium hydroxide). The mixture is a clear colorless fluid with a tolerably strong smell of chlorin, and very strong oxidizing properties. In strength of from 15 to 20 per cent., a solution of this dissolves all the formed elements, such as pus cells, fibrin, blood, epithelium, and various bacteria which are not protected by waxy covering, so that, in examining tuberculous material, everything is destroyed except the tubercle bacilli and the other acid-fast organisms. Even after six to eight hours' exposure, these organisms retain their virulence and staining properties, while other bacteria, such as cholera spirilla, typhoid bacilli, streptococci, and staphylococci, lose their virulence and general properties in from one to two hours, and even more quickly in a solution. Uhlenhuth advises the use of 30 c.c. of sputum, 15 c.c. of antiformin, and 55 c.c. of normal salt solution. This is thoroughly mixed and placed from two to three hours in an incubator at 37° C., or for one-half to one hour at a temperature of 60° C. At the end of this time there is a half transparent yellowish fluid which should be placed in the centrifuge, and the sediment so obtained stained by the usual methods.

Finkelstein found that, in 125 examinations, this method gave wonderfully good results, and is probably more reliable and more sensitive than any of the other methods which have been suggested for the same purpose.

Another method for separating the tubercle bacilli from various substances is that of Lange and Nitsche. This is based upon the chemical affinity of the tubercle and other acid-fast bacteria for ligroin and other allied substances, such as xylene and benzine. Their method consists in using a solution which is made homogeneous by the action of normal sodium hydroxide solution, and this is thoroughly shaken up with the ligroin and allowed to separate, when at the boundary

between the ligroin and the water a great number of tubercle bacilli are collected, if any are present, and smear preparations made from this part usually contain the bacilli. It is sometimes difficult to fix these preparations, and it is best to use slides upon which has been placed a few drops of a 5 per cent. solution of white of egg. Lange and Nitsche have used this method in connection with the antiformin as a dissolvent, and found that it affords a much better method, as the strong alkaline solution originally suggested sometimes destroys the tubercle bacilli as well as others, which is not the case with the antiformin solution.

Gatti¹ has detailed his experiences in using the antiformin method and has arrived at practically the same conclusions as are given above. He is of the opinion that the solution may be used in any strength from 10 to 70 per cent., and that the solution is usually free from all other germs except the tubercle bacillus. He apparently neglects the other acid-fast bacteria. He also found that from 15 to 20 per cent. antiformin gives the best results.

Another simple method is that of Zahn, who, working in Moritz's clinic, found that the addition of calcium chloride made a more rapid, and, he believes, better method than those mentioned above. The resulting solution is uniform, easily spread, can be fixed without difficulty, and does not interfere with the staining. The method is as follows:

To from 5 c.c. to 15 c.c. of sputum are added 50 c.c. of water and 5 c.c. of a 4 per cent. sodium hydroxide solution. This is placed in an Erlenmeyer glass and is boiled with shaking for two or three minutes. It is then cooled under running water and 1 to 2 c.c. of a 5.5 per cent. dried calcium chlorate solution is added, and the mixture well shaken. It is then placed in a centrifuge for one or two minutes, the clear fluid is then poured off and the tube filled at least three times in this manner. The resulting sediment is now placed on a wet filter paper in a funnel, and 2 c.c. to 4 c.c. of calcium chloride solution added. The filter is then spread out and the remaining substance spread on a slide, warming it slightly, but not too much as it is apt to coagulate. After it is properly spread, it is stained by the usual method. The same solution may be used for urine, stools, exudate, blood, or crushed up material from various organs, lymph nodes, or spleen. Zahn claims that this method is easy to employ, and gives as good or better results than the methods in common use.

MUSCULAR RIGIDITY AND LIGHT TOUCH PALPATION. Pottenger² has, during the past year, called attention in several publications to the value of muscular rigidity in the diagnosis of inflammations of the lungs and pleuræ, and this method has also been commented upon by several other observers, among whom may be mentioned Ebstein.

¹ Il Policlinico, August 14, 1910; Sezione Pratica, p. 1027.

² Deutsche medicinische Wochenschrift, April 21, 1910, p. 751.

The test consists in feeling the resistance of the muscles over the inflamed area, and making comparison with that over the normal areas. The muscle rigidity is changed from the normal, and may be in condition of acute spasm which is present when there is an acute inflammatory process, or of chronic changes in the muscles which are seen in cases in which the inflammation is of a milder grade and of long standing. In primary acute inflammations of either the lung or pleura, the spasm of the muscle is marked and easily made out, and sometimes can even be seen. A very good way to determine this is to roll the muscle between the thumb and finger and make a comparison with the same muscles upon the other side, or, if the inflammation is on both sides, the comparison may be made with other muscles. In acute inflammation on a side of a chronically inflamed part, the muscle changes are not as pronounced, and, in mild cases of chronic inflammation, the changes are of a trifling extent and very difficult to tell from the normal rigidity. In marked chronic inflammation involving large lung areas, the changes in the muscles are usually marked and may be easily made out upon palpation and upon comparison with the normal side.

Light touch palpation is a name given to a diagnostic procedure in which the fingers are passed very slowly and very lightly over the skin. The amount of resistance in the skin differs over different organs, so that it is possible, according to Pottenger, to outline the heart and liver with considerable accuracy, in fact he believes with greater accuracy than by the ordinary diagnostic methods. Where the organs are covered by the ribs he advises the palpation to be made in the intercostal spaces, beginning to one side of the organ to be made out and moving slowly toward it, and, in outlining the heart, he advises the patient to either hold the breath or to breathe very lightly. When the organ is reached, there is a decided difference in the sensation imparted to the finger. The difference in feel differs in different individuals and may be described as a difference in the sensation. In order to determine this it requires very marked attention.

Any new diagnostic sign should receive careful attention by all clinicians and yet it would seem that the usefulness of this sign would hardly be as great as Pottenger would have us believe, as even if the differences which he has noted are present it requires unusual ability in order to determine these differences with a sufficient degree of accuracy.

THE BORDET-GENGOU PHENOMENON IN TUBERCULOSIS. The Bordet-Gengou phenomenon has been applied in tuberculosis by Marmorek,¹ and there has been another report by Bergeron.² This latter observer has obtained rather remarkable results, since they agreed with the clinical findings in 204 out of 213 cases.

¹ La Presse Médicale, January 6, 1909.

² Ibid., January 1, 1910.

The principles of the test are similar to those of the Wassermann reaction in syphilis, the general principles of which are given above.

The test, as applied in tuberculosis, consists of using the filtered urine of the patient as the first antigen, as, according to Marmorek, it contains the tuberculous toxin in cases of active tuberculous disease. Marmorek's antituberculous serum was used for the antibody, and guinea-pig serum as the complement. The second antigen used was a 1 to 10 dilution of sheep's red blood corpuscles, and the antibody, the previously heated serum of a rabbit rendered immune to sheep's corpuscles. In making the test, 0.2 c.c. (4 drops) of fresh, filtered urine was placed in a small sterile test tube with 0.3 c.c. (6 drops) of antituberculous serum and 0.05 c.c. (1 drop) of fresh guinea-pig serum. The mixture is left in the incubator at 37° C. for one hour, at the end of this time 0.3 c.c. of 1 to 10 dilution of sheep's red blood corpuscles is added, together with the hemolytic serum necessary to destroy these corpuscles in forty-five minutes. This mixture is again placed in the incubator and kept there for an hour, when it is examined a second time.

The 213 cases which were examined by this method were divided into three groups: (1) The tuberculous cases; (2) those in which it was suspected that the disease might be tuberculous, and (3) the non-tuberculous. In the first group, out of 133 cases, 131 showed a complete or partial positive reaction. The reaction was negative in only 2 cases. The results in the second group of the suspicious cases were varying; and in the non-tuberculous, out of 74 cases, the reaction was negative in 67, while in 7 there was a partial hemolysis only.

The test was therefore seen to be of value, but as Bergeron concludes, is not infallible. It is possible that further researches along this line may render this test of the same value as it appears to be in syphilis.

THE USE OF THE X-RAY IN TUBERCULOSIS. A very welcome article on the use of the α -ray in the diagnosis of the pulmonary tuberculosis is that of Minor.¹ So many of the statements on the use of the α -ray in the diagnosis of lung diseases have been made by men who are experts in radiography but not in clinical medicine, that it is particularly gratifying to have a short, clear article by one who has a technical knowledge of both sides of the subject.

The most interesting problem, of course, is whether or not the α -ray is of great value in the early diagnosis of the disease, and whether, in the very earliest cases, the old standard methods of diagnosis must still be regarded as the only ones which are reliable, because the very early lesions are not visible and the very small apical lesions sometimes seen are usually old, small shrunken foci and not beginning conglomerate tubercles. Minor believes, however, that the α -ray is of great value, especially if taken in consideration with the other physical signs.

¹ Bulletin of the Johns Hopkins Hospital, September, 1910, p. 263.

In order to get satisfactory results it is necessary to have an absolutely dark room, and the operator should go into it at least five minutes before he starts his machine in order to have the eyes become sufficiently sensitive. The operator must be thoroughly familiar with his apparatus and must have the best kind of equipment. The question as to whether one must use a fluoroscope or a radiograph might be answered in this way, that for clinical work in the average case the fluoroscope will be found much more satisfactory and its systematic use will throw great light upon changes taking place in the lung. There is no other procedure which can give such information as to the topography of the disease and which will call attention to the slight foci which would otherwise be overlooked. In order to obtain good results it is necessary to have a tube which has a sharp focus and one in which the penetration of the tube may be raised or lowered instantaneously without taking the eye from the screen. The tube should be properly protected for the safety of the operator and be supplied with a proper diaphragm so as to cut down or enlarge the illuminated area so that the entire chest may be examined, or a smaller portion be studied in detail. The fluorescent screen must be sufficiently large to allow one to examine the entire thorax at one time. The patient should be at least two feet from the anode, and further is better, as it lessens distortion. Complete familiarity with the normal picture is essential, and systematic routine in examination will be found indispensable. Minor suggests the following: (1) The comparative size and shape of the two lung areas. (2) The course and angle of the ribs. (3) The sternal and mediastinal shadows. (4) The position, size, and shape of the heart. (5) The motion of the bases. (6) Costodiaphragmatic angle. (7) Size and clearness of shading of the apices. (8) Any shadows in the body of the lung.

In some instances, authors state that very distinct shadows may be seen and that careful examination of the lungs by the ordinary method fails in findings. Minor has not seen many such cases where the apex was involved, but in some instances in which the lesion is in the body of the lung or in which the changes are in the bronchial glands, the x-ray may show the disease and physical signs be absolutely absent.

Williams, of Boston, in 1897, called attention to the limitation of motion of the base of the diseased lung as compared with the good lung, and this sign is usually known by his name.

Minor has found this of great value in corroborating the results of percussion, and while he believes it of value and one which would raise the otherwise dubious symptoms to a higher value, the limitation of motion in itself he regards as suspicious, but that it does not justify a diagnosis.

As I have just said, the shadows of enlarged glands are particularly valuable, and these are of two sorts—those around the roots of the lung

and those among the main bronchi and their prolongation downward. The latter are the more common and are seen in a large number of cases as irregular ghost-like masses of patchy shadow often strung out like beads, radiating downward and outward from the third rib, and reaching at times nearly as low as the diaphragm. A less common form of gland shadow is that which projects out on one or both sides of the sternum at the level of the second rib and, being rather globular in shape, suggests the shadow of an aneurysm, though the differential diagnosis is not usually difficult. Minor also discusses the findings in moderately advanced and advanced cases, which are of less interest to the general practitioner.

TREATMENT OF TUBERCULOUS CERVICAL ADENITIS BY THE RÖNTGEN RAYS. Leonard¹ is of the opinion that one of the best methods of treating tuberculous cervical adenitis is by the use of the x -ray, the best results being obtained in the early cases, and in these, if the treatment is not too active, a cure may take place without scarring and without the breaking down of the glands. The treatment is also of use in the older cases, as in those in which recurrences follow a complete operation with entire healing of the skin, and it may also be used in those cases in which there are persistent sinuses, and ulcers which refuse to heal.

One should bear in mind that the x -ray treatment is not only in these, but in other conditions, a two-edged sword, and to be effective the treatment must be adapted to the individual patient. If the exposures are not sufficiently long there will be no progress, while if the treatment is pushed too far the improvement ceases and progress is retarded. This is probably due to the fact that, as the treatment progresses, the opsonic index rises, but if treatment is too energetic, negative phases will be produced which may be detrimental to the patient.

TRAUMATIC TUBERCULOSIS. One of the most interesting articles on this subject that has been published for a long while is a paper by Weber.² His paper does not consider those cases of direct tuberculous infection such as are acquired by pathologists in the postmortem room, and by butchers from tuberculous cattle, and similar accidental inoculations; but he has taken up the study of the cases of tuberculosis which have been influenced by trauma, in which the tubercle bacillus could not have been introduced from without. He divides these cases into three groups: (1) Cases in which a decided traumatism of some kind is followed by signs of either acute disseminated miliary tuberculosis or acute metastatic localized tuberculosis. (2) Cases in which signs of pulmonary tuberculosis follow, or are first noticed, after a supposed

¹ Journal of the American Medical Association, May 14, 1910, p. 1596.

² British Medical Journal, May 14, 1910, p. 1153.

injury to the lungs. (3) Cases in which an injury to bones or joints, or parts of the body other than the lungs, is followed by signs of tuberculosis more or less localized to the region of the trauma.

The first group, the cases of miliary tuberculosis, are fortunately rather rare, although there are a number of examples in the literature. Weber relates a case in which a man, aged thirty-three years, had an acute miliary tuberculosis following a blow on the epididymis where there was an old focus of tuberculosis. Death followed in twenty-five days after the blow. Apparently, the tubercle bacilli were set free and carried by the venous blood to the heart, and thence through the body. The chief changes were in the lungs, where a uniformly distributed miliary tuberculosis was found. A second example of the same kind is a case of a student, aged twenty-one years, who received an injury to one of his ankle-joints. He was affected shortly after with an acute pulmonary affection characterized by dyspnea and cyanosis, which were present in the patient previously mentioned, and death took place in about twenty-five days after the injury. At the autopsy, both lungs were found to be full of miliary tubercles; in the ankle there was an old deposit of tuberculosis, and it was ascertained that during childhood the patient had suffered from a disease of his ankle.

The general disseminated tuberculosis may also follow surgical operations, and Orth has referred to surgeons losing patients from fatal acute tuberculosis after operations on localized tuberculous lesions in the bones. There are also cases on record in which death took place from acute miliary tuberculosis (the lesions being especially in the lungs) a few weeks after childbirth or abortion, in which cases there are tuberculous foci in the pelvic organs. The same thing has happened from an intubation for diphtheria in cases in which there was tuberculous laryngitis. These cases may be multiplied to include various parts of the body.

In the second class of cases, in which the disease in the lungs is first noticed after an injury, Weber also gives a number of interesting examples, and it is quite easy to understand how a severe contusion of the thorax may actually injure the lungs and pleura, and this has been actually demonstrated experimentally; and we also know with what great frequency there are quiescent tuberculous lesions present in the lungs and lymph nodes of apparently healthy individuals, and it is quite easy to see how these may be squeezed or torn in such a way that the tubercle bacilli are mechanically disseminated over the neighboring lung tissue, the vitality of which has been temporarily lowered by the injury. Among the cases on record, of which there are quite a number, is that of Williams, who records the case of a mate of a merchant vessel who fell from the mast to the deck and fractured three ribs. Following this there was a rapid development of well-marked symptoms and physical signs of tuberculosis, with hemorrhage, expect-

toration, and cavity formation upon the injured side of the chest. He made a quick recovery and was able to return to his occupation.

The third question as to whether tuberculosis develops locally, especially in the bones or joints following injury, is one that requires great care in studying, for with regard to such exposed parts as knees, ankles, and long bones of the extremities there is always a history of some slight traumatism, and one should be slow in stating definitely that the injury was the cause of the local disease. It has been shown experimentally that, in various general septic conditions, local lesions could be determined by injuries, even when the site of the inoculation was at an entirely different part of the body; similar experiments have been carried out with regard to tuberculous disease of the bones and joints. For example, Schüller injected tuberculous material through a tracheal wound into the lungs of dogs and rabbits, and on the same day injured one of the knee-joints of the animal experimented upon. He succeeded in not only producing a general tuberculosis, but also a tuberculous synovitis of the injured joint, and sometimes there would be tuberculous osteomyelitis. Other observers have not found it quite as easy to set up a local tuberculous process in this manner, but there is no question whatever in regard to the possibility of so doing. One of the best summaries of the experimental work of this kind is that of Jordan.¹

The cases which occur in man must, of course, be due to a preëxisting tuberculosis which is perhaps very limited in extent and quiescent. Shattock explains the onset of tuberculous bone disease after local injuries in children by supposing that it is a gradual leakage of tubercle bacilli from tuberculous lymph nodes, and that some of these may be carried by the blood stream and lodge in the bone marrow, where they remain quiescent until the resistance of the tissues is lowered by some injury.

Pietrzikowsky believes that about 20 per cent. of the tuberculous affections of the bones and joints are connected with injuries, and that the interval between the accident and the development of obvious signs of tuberculosis is neither very short, a few weeks, nor very long, not more than a year at the outside.

Moser is of the opinion that the traumatic origin of articular tuberculosis can never be accepted as proved, but only as being more or less probable. The interval between the injury and the manifestation of tuberculosis, he thinks, must be at least, four to six weeks. The shorter the interval, the less likely is the general tuberculosis to be traumatic.

HOSPITAL INFECTION OF TUBERCULOSIS. Squire² has made a study of the question of infection of the resident medical nursing staff of the

¹ *Münchener medicinische Wochenschrift*, 1909, vol. xlviii, p. 1741.

² *British Medical Journal*, April 30, 1910, p. 1039.

Mt. Vernon Hospital. Of the nurses and maids, it was found that nearly 14 per cent. of the nurses and 8 per cent. of the maids had been infected with tuberculosis before they applied for duty, and it was found that of these individuals who had previously resided in tuberculous hospitals the number of cases of tuberculosis was without doubt as great as among those who had never worked in the hospital. It appeared that the greatest danger was among those individuals who had a history of tuberculosis in their family, although the number of cases studied was too small to lead to any very definite conclusions. As to the resident medical officers, it appears that the risk of infection is very small, and it is apparently but slightly, if any, greater than in a general hospital. It is perhaps doubtful if there is any greater risk to the resident medical officers of any well-ordered hospital than among the general mass of town dwellers of similar social position. Infection with tuberculosis does occasionally occur as the result of the duties of the nurse, but probably not more frequently among the nurses in a hospital for consumptives than among the general body of nurses.

TUBERCULOUS INFECTION LAUNDRIES. From studies that have been made in Paris and elsewhere, it is known that persons working in laundries not infrequently contract pulmonary tuberculosis, and there may be also local infections upon the hands.

Roepke¹ has made a study of the danger of the spread of tuberculosis from the soiled linen of tuberculous patients. His investigations were carried out in the Stadtwald Sanitarium. The air of the room in which the clothes are sorted and tied up into bundles was studied by means of sterilized test objects being placed about the room, some near the floor and some from 3 to 5 feet above it. After the sorting, the test objects were wiped with gauze tampons which had been previously sterilized and moistened with sterilized salt solution. Guinea-pigs were then inoculated, both directly and after twenty-four hours' incubation in bouillon. The dust so accumulated contained pus-forming bacteria and tubercle bacilli. The pyogenic organisms were most numerous on the objects nearest the floor, and tubercle bacilli were not present on objects placed higher than $1\frac{1}{2}$ meters. A study was made of the dust that settled upon the workers' faces, but in most instances the virulence of this dust was found to be small. The dust from the face and head of the women who did the sorting of the clothing did, however, contain tubercle bacilli. Studies were also made to determine how this infection could be prevented, and Roepke suggests that the great prophylactic measure is to avoid unnecessary moving about of the soiled objects, and, if this is done, the danger of infection is slight; he also suggests that the floor be wiped with antiseptic solutions and that those who do the work be advised not to bend near to the floor, and to breathe with the mouth shut.

¹ *Zeitschrift für Tuberculose*, December, 1909.

In private families infection is easily prevented by moistening the clothes with some antiseptic solution, but in sanitariums and hospitals it is usually necessary to sort the clothes before they are disinfected.

TUBERCLE BACILLI IN THE FECES. Fabricci¹ has called attention to the fact that, in cases of tuberculosis in children in whom the sputum is usually swallowed, tubercle bacilli may be detected in the feces. The detection of the tubercle bacillus under these circumstances is a matter of great difficulty. Several methods have been used, the best of which is that of Strassburger, which consists in adding a 20 per cent. of antiformin, which destroys all the bacteria present except the tubercle bacillus. Absolute alcohol is added to this mixture, a sediment obtained from the centrifuge, and the specimen examined microscopically. The smegma bacillus is excluded by treating the specimen with glacial acetic acid. This is another one of the scientific researches, which, while it has a certain amount of interest, is not a method which will ever be of any use to the practising physician. It would seem that such methods would be exceedingly uncertain, even when carried out with very good technique.

TUBERCULOSIS AMONG THE JEWS. It is a popular idea, and one which is more or less true, that the Jewish race seems to enjoy more or less immunity against infectious diseases and especially for tuberculosis, and while this is true, they also have other racial peculiarities, such as the frequency of diabetes and of nervous diseases, and the comparative rarity of alcoholism; this latter in spite of the fact that large numbers of Jews use alcohol moderately, and always have used it.

Tuberculosis cannot be said to be exactly rare among the Jews, but the mortality from it is very much less than among other peoples.

Cheinisse² has given some interesting figures upon this subject. In America, from the census of 1900, it is found that the deaths from tuberculosis per 100,000 are as follows: Native born, 112.8; German, 167; French, 184.7; Irish, 339.6; Poles and Russians, and these are chiefly Jews, 71.8. In New York, the mortality from tuberculosis among the Jews is very much lower than among the Irish and Italians living in practically the same parts of the town, and this in spite of the fact that many of the Jews are tailors and live in sweat shops. In Vienna, where the census is taken with regard to the confession of faith, the mortality of tuberculosis per each 10,000 of the population is as follows:

	Catholics.	Protestants.	Jews.
Tuberculosis of lungs	38.8	24.6	13.1
Other forms	49.6	32.8	17.9

The reason for this immunity is difficult to explain. It has been suggested that it was owing to the religious observances which deal

¹ La Pediatria, October, 1909.

² La Semaine Médicale, April 27, 1910, p. 193.

so largely with the hygiene of the race, particularly as regards the meats, tuberculous meat being rigidly excluded, but while this might explain the lower morbidity, it does not explain the extremely low mortality.

Reibmeyr thought the immunity depended upon a sort of natural selection due to long centuries of intermarriage among the Jews, but it is noted in Berlin, where intermarriage of the Jews with other people is common, that there is very little increase in the death rate from tuberculosis in these cases. Others have thought it was due to the absence of alcoholism, but it is probable that the total amount of alcohol consumed is as great as that used by other people, although, as noted above, there is not the same tendency to indulge in excesses.

Cheinisse is inclined to believe, as are others, that through many centuries of living in ghettos and under unfavorable conditions, the Jews have gradually acquired an adaptation to such circumstances, and that this explains the low mortality and the relative rarity of the acute forms of tuberculosis among the Jews.

TUBERCULOSIS IN OLD PEOPLE. Staehelin¹ has called attention to the frequency with which tuberculosis in old people is overlooked, and some of the difficulties in making the diagnosis. He lays considerable stress upon the following points: In old people with subnormal temperature, or a temperature which does not follow the normal curve, one should always think of the possibility of tuberculosis of the lung. One of the most important physical signs is the lagging of one-half of the thorax in breathing. If this exists, even in the most trifling degree, very careful examination of the entire chest should be undertaken. In percussing, it is important that the finger used as a pleximeter should be laid on the skin as lightly as possible, as it is in this manner that trifling differences in the percussion note are best brought out. Upon auscultating, the patient should be instructed to breathe as deeply as possible and to cough as hard as he is able, in order to better bring out the presence of rales. If the disease is suspected and there are no physical signs, the Röntgen rays should be used. The sputum should, of course, be as carefully examined as in young people, and the diagnosis is cleared up in many cases after repeated examinations.

TUBERCULOSIS OF THE LUNGS WITHOUT COUGH OR EXPECTORATION. Walsh² had his attention called to this subject by a case in the Phipps Institute in which the patient died without at any time manifesting the symptoms of cough and expectoration. A similar case occurred at the White Haven Sanatorium.

While this fact has been noted by various writers, the significance of it has not been generally recognized. In the examination of 35

¹ Berliner klinische Wochenschrift, February 28, 1910, p. 373.

² Pennsylvania Medical Journal, July, 1910, p. 764.

girls who considered themselves absolutely well, and who had applied for admission to a sisterhood in Philadelphia, 13 showed nothing to raise the slightest suspicion, 13 showed physical signs allowing at least a doubt, while 9 showed positive tuberculosis. Three of these 9 had neither cough nor expectoration.

Inasmuch as great stress is laid upon the early diagnosis of tuberculosis, and very properly so, it would seem very essential for the practitioner to bear in mind that at least 1 out of 20 (5 per cent.) of persons coming to be examined for tuberculosis may have the disease without either cough or expectoration, and yet with sufficient symptoms and signs to enable one to make the diagnosis a certainty.

TUBERCULOUS CERVICAL ADENITIS. Lewis¹ has made a study of fifteen consecutive cases of tuberculosis of the cervical lymph nodes removed at operation in the Children's Hospital, Boston, and the Boston City Hospital. The study was undertaken with a view of determining the frequency of the infection of the bovine tubercle bacilli. A number of different observers have made similar reports.

Park, in a study of 16 cases, found that 2 were of the bovine type; the English Commission found 3 of the bovine type out of 9 cases; Oehlecker isolated the organism from 14 cases, 2 of which were in adults, both being the human type, and 12 in children, 4 being due to the bacilli of the bovine type; Lewis found 9 cultures of the bovine type and 6 of the human type, basis being made on the adaptability to artificial cultivation, character of the growth on glycerin bouillon, and virulence for rabbits.

In Lewis' cases, the average age of the patient with the bovine type was eight and a half years, the youngest was eighteen months, and the oldest, eighteen years. The average age of those patients yielding the human type of bacillus was seventeen and two-thirds years, the oldest was thirty-two years, and the youngest, eight years. Of the cases of cervical gland tuberculosis in persons over fifteen years of age, four-fifths were infections with the human type. In cases of persons below fifteen years of age, seven-ninths were of the bovine type.

From this, Lewis concludes that the bovine type of infection is common in early life, and the human type common in young adults.

TUBERCULOUS ARTHRITIS SIMULATING RHEUMATISM. Melchior² has reported a case and commented upon this condition which was described some years ago by Poncet, and also by Grocco. It is characterized by an arthritis which somewhat resembles acute rheumatism, but has a more subacute onset, less fever, the pain is not so intense, there is no characteristic sweating, and none of the erythema of the skin over the affected joint. It occurs usually in individuals who have

¹ Journal of Experimental Medicine, January 1, 1910, p. 82.

² Berliner klinische Wochenschrift, March 14, 1910, p. 469.

a tuberculous focus somewhere in their body, or in those who are exposed to tuberculosis. After some little time, certain of the joints clear up, while in one or more there may be a chronic tuberculous joint either with considerable fluid, or with the formation of tuberculous nodules within the joint. In Melchior's case, the tubercle bacilli were demonstrated in the blood.

These cases should not be confused with acute rheumatism nor with the very acute tuberculous affections of the joints occurring in the course of miliary tuberculosis, in which the process is merely a part of the latter condition which is rapidly fatal.

THE TEMPERATURE CURVE IN PULMONARY TUBERCULOSIS. Baker¹ made a study of the temperature in its relation to this disease, and calls attention to various facts in connection with it. The most accurate method of taking the temperature is in the rectum. The mouth temperatures are reasonably satisfactory when taken under certain conditions. The axillary temperature is usually unsatisfactory, the difference between the axillary and rectal curves being from $\frac{1}{2}$ to 2 degrees. In using mouth temperatures, the thermometer should be left in place for five minutes, regardless of the time in which it is supposed to register, and from ten to fifteen minutes outdoors. Lawrason Brown advises that in cold weather the patient should come indoors ten to thirty minutes before the temperature is taken, and in the case of mouth breathers, the mucous membrane being considerably cooled in respiration, this is especially important.

In children, the temperature range is relatively higher than in adults, although not invariably so, and in old age there may be an absence of fever, even when the disease is active. The taking of food may cause a rise of temperature; this may be quite marked in the early cases. It may also alter the daily curve so that the maximum is reached between 2 and 3 P.M.

Papillon believes that this digestive fever is particularly high in anemic individuals. The effect of exercise is to slightly raise the temperature, but this disappears quickly under ordinary circumstances.

Penzold has pointed out that the fever so produced must remain for a period of rest. In very nervous patients, temperature may occur which is purely neurotic in character and which, in some sanatoriums, is called thermometer fever. The effect of menstruation upon the temperature is noted below in reference to an article by Dr. Welch.

UNEQUAL REACTION OF THE PUPILS TO LIGHT AS AN EARLY SIGN OF PULMONARY TUBERCULOSIS. Fodor² has made a study of the reaction of the pupil to light in cases of pulmonary tuberculosis. It has been known for a long time that, in unilateral tuberculosis, an inequality of the pupils is not uncommon, but up to the present time,

¹ Dublin Journal of Medical Sciences, August, 1910, p. 95.

² Wiener medicinische Wochenschrift, March 12, 1910.

this sign was considered as a rather infrequent occurrence, and of no practical value in diagnosis.

Fodor, however, determined that, while it was of little service if the test were made in a well-lighted room, when made in semi-obscurity it was found in practically all cases of tuberculosis of the lung, and that it was quite independent of the intensity or extent of the lesion.

The pupil on the affected side dilates more rapidly and to a greater extent than the other. Upon bringing the light close to the eye, the pupil on the affected side contracts more slowly and somewhat less. This test should be of considerable value in dealing with early cases of tuberculosis, but it should be borne in mind that doubtless other affections of one side of the thorax, such as tumors, aneurysms, and pleurisy, would cause the same dilatation by irritation of the sympathetic nerves.

THE RELATION OF THE SIZE OF THE BREAST TO TUBERCULOSIS. Gasperini and Cartolari¹ published an account of their observations on the relation of the size of the breast to pulmonary tuberculosis. Similar observations have been made by Sargo and Suess.

The breast on the diseased side is smaller than on the healthy side, and this diminution may be noted very early in the disease. The measurements were made by the vertical and horizontal diameters of the areola, as other measurements of the breast are exceedingly difficult to make with any degree of accuracy. The size of the areola varies from 2 mm. to 9 mm. Males were excluded, and also all cases in which the difference in the size of the breast might be explained by any local condition. The sign was noted in 35 cases out of 146, and always upon the side affected. In 180 women without any disease of the lung, diminution of the size of the breast was found present in only 5 per cent. They also found that when the disease of the lung became arrested, the areola on that side ceased to diminish and, in some cases, became larger.

DYSPNEA DUE TO TUBERCULOUS MEDIASTINITIS. Mann² has called attention to two cases of paroxysmal dyspnea in children due to a cause which has apparently not been recognized, that is, tuberculous mediastinitis.

The first case was a boy, aged eight years, who had had bronchitis for two years; he then began to waste, and had attacks of nocturnal dyspnea which increased and were accompanied by congestion of the face and stridulous breathing. There was pain in the chest, a deficient movement of the upper part of the right chest, deficient entry of air, a slight stridor was heard all over the right side and dulness over the upper part of the sternum extending more to the right than to the left

¹ *Riforma Medica*, January 31, 1910.

² *Guy's Hospital Gazette*, February, 1910.

in the first and second intercostal spaces. The neck was swollen, and there were enlarged veins in the lower part and also over the clavicles; the episternal notch was obliterated. Examination with the x-ray showed a diminished transradiancy of the upper chest. Later, the symptoms increased, the face becoming edematous and the superficial veins enlarged, and there were severe attacks of dyspnea and severe pain. The attacks gradually became less urgent, and the disease eventually attacked the last cervical and upper dorsal vertebrae. Under the use of proper treatment by means of a jacket and jury-mast, the disease eventually disappeared.

The second case was in a child, aged three years, with the same symptoms, in which death occurred, and there was found a large tuberculous abscess in the mediastinum.

VARIATIONS OF TEMPERATURE DURING THE MENSTRUAL PERIOD. Welch¹ has made a study of 500 female patients, between the ages of eighteen and forty-five years, all suffering from tuberculosis. He divided these into three classes as suggested by Turbon, of Davos: (1) The early cases, including under this head all those with not more than one lobe affected; (2) the cases with two lobes affected; (3) the advanced cases, namely, with three or more lobes affected, or complicated with laryngeal or intestinal lesions.

In 284 cases in the first class, there were changes in the temperature in 68, or 23.9 per cent., during the menstrual period. The change was usually a depression of 1 to 1.5 degrees, the cases having the greatest amount of fever showing the widest range of change. In most of the cases the depression commenced with the flow, while in others, it was deferred until the second or third day. Occasionally the fall in temperature preceded the flow. In the second class, there were 160 cases. In these there were changes in the temperature in 30, or 18.7 per cent., the change being usually a rise of temperature for a day or two preceding the flow and continuing during the period, or rising during the menstruation for one or more days. In quite a number of the cases there was very high temperature during the period. In the third class, there were 56 cases, and in 7 there were changes in the temperature. In over half of these the temperature was raised both before and during the period.

The comparatively small number in which change was noted were due to the large proportion of cases of amenorrhea, which, as is well known, increases progressively in proportion to the extent and severity of the disease, in the first class being 11.9 per cent.; in the second, 23.7 per cent.; and in the third, 62.5 per cent.

Welch was only able to find two other references to the temperature during menstruation in tuberculosis, one by Burton-Fanning, who

¹ *Lancet*, March 5, 1910, p. 639.

states that in about half his patients there was a characteristic rise of temperature during the week that precedes the onset of menstruation, the average increase of temperature amounting to 0.5, lasting for an average of six days and ending on the day before menstruation, or extending over the first or second day of the flow.

Pottinger states that it is not uncommon to have a rise of temperature associated with the menstrual period, this coming on a few days before the flow, but it may not appear until the flow is established. In early cases this amounts to only a fraction of a degree, but in advanced cases he states that he has seen a maximum of 103° to 104.°

DYSMENORRHEA AND TUBERCULOSIS. Gräfenberg¹ has considered the subject of dysmenorrhea and tuberculosis, and calls attention to the contribution of Eisenstein and Hollos, who found that, in a large series of injections with tuberculin, 118 women with disturbances of menstruation reacted to subcutaneous injections. In 27 primary cases of dysmenorrhea there was found a tuberculin reaction, and in 23 of these it was possible to make out the tuberculosis by physical signs. They regard the dysmenorrhea as a symptom of a general intoxication with the toxin of the tubercle bacillus and of the general disturbance of the metabolism.

LOCALIZED TUBERCULOUS MENINGITIS WITH SYMPTOMS OF CEREBROSPINAL MENINGITIS. Achelis and Nunokawa² have reported an interesting example of a patient who entered the clinic as a typhoid suspect. They found that he had a nephritis, which autopsy revealed to be of a tuberculous nature. There was a moderate grade of fever; the patient on one day showed considerable mental disturbance, on the following day there was stiffness of the neck, the pulse had become rapid, the left pupil dilated more than the right, there was a left-sided ptosis and a left-sided facial paralysis. Kernig's sign was very marked, and the patient passed into coma and died six days later. Tubercle bacilli could not be found in the cerebrospinal fluid, but the fluid contained a great number of lymphocytes and was slightly cloudy. Upon filtering this and adding a few drops of 5 per cent. acetic acid, it again clouded. This test is generally regarded as indicating inflammatory changes of the meninges. At the autopsy it was found that there was tuberculosis of the right lung, of the kidney, and localized inflammation of the meninges in the lumbosacral region.

MATERNAL NURSING AND TUBERCULOUS MENINGITIS. It is generally admitted that infants nursing at the breast are more or less protected against infectious diseases. It is rather surprising to note the results of investigations carried on by Zappert.³ In 125 children dying of tuberculous meningitis at St. Anne's Hospital, in Vienna, it was found

¹ Münchener medicinische Wochenschrift, March 8, 1910, p. 515.

² Ibid., January 25, 1910, p. 187.

³ Wiener medicinische Wochenschrift, January 29, 1910.

that 88 had been nourished at the breast, at least during the first three months, and in 37, bottle feeding had been used. This represents a proportion of 73.4 per cent. against 29.6 per cent. If one takes into account the cases in which maternal nursing was tried but abandoned during the first few weeks of life, there were 101 breast fed and 24 artificially fed, or 80.8 per cent. against 90.2 per cent.

Keller, at the suggestion of Zappert, made a study of 1300 mothers and found that 278, or 21.4 per cent., had not tried to nurse their infants, while 120 had ceased to nurse during the course of the first three months, a total of 398 who did not nurse their babies as opposed to 902 who did, or 36.6 per cent. against 69.4 per cent. In other words, the proportions were approximately the same as those for the children who succumbed to meningitis.

One may conclude that, in cases of tuberculous meningitis, the method of feeding plays no particular role. It would be extremely interesting to have studies made along this line showing the relation of the cases of tuberculous meningitis to sources of infection.

In my own experience, I have seen a number of breast-fed babies who have died of tuberculous meningitis, but in every instance there was a close association with someone suffering with pulmonary tuberculosis; in some instances, the mother, and in others, some other member of the family. From a somewhat limited experience I am inclined to believe that practically all of these cases are from direct infection from other cases, and not dependent upon infections through milk.

TUBERCULIN REACTION IN SYPHILITICS. Nicolas, Favre, and Charlet¹ have investigated the tuberculin reaction in 47 cases of syphilis in various stages of the disease, all of whom were free from any clinical signs of tuberculosis, and there were no reasons to suspect the disease.

By using the Mantoux test of injecting the tuberculin into the skin, 44 gave a positive reaction, 2 were feeble or doubtful, and 1 was negative.

The von Pirquet reaction was positive in 28 cases. Inasmuch as there is some difficulty in determining whether a lesion is tuberculous or syphilitic, it is instructive to know that neither the intradermal injection nor the von Pirquet reaction are of any service in distinguishing tuberculosis from syphilis. It is extremely interesting to have the results of the subcutaneous method of using tuberculin in a similar series of cases.

THE CLASS METHOD OF TREATMENT OF TUBERCULOSIS. This method was introduced by Dr. J. H. Pratt, of Boston, in July, 1904, and since then has been taken up in many parts of the country.

Cohen² has given a brief account of the work that is carried out in the classes at the Medical Dispensary of the University of Pennsylvania.

¹ *Lyon médical*, March 20, 1910.

² *Journal of the American Medical Association*, April 9, 1910, p. 1193.

Almost all the classes have been modelled along the same lines as originally suggested by Dr. Pratt; the patients keep their own records, temperature, pulse, food, hours spent in the open air, and are visited in their homes by a paid nurse or social worker, or in some instances, by volunteer visitors who see that the details of treatment are carried out, and also see that the patient is given proper financial assistance when it is needed. In some classes, these visits are not carried out. Many classes have been able to do better work by having special funds supplied by various charitable bodies which provide for unusual expenses of the patients, such as record books, thermometers, sputum boxes, special diets, tents, cots, and the like.

The classes assemble at regular intervals, usually once a week, each patient being examined in turn, and very often the class is talked to as a whole, special mention being made of those who have made the records in gain in weight, in hours spent in the open air, and similar things. The success of the class depends largely upon the enthusiasm and the personality of the physician in charge. It furnishes a method by which a large number of patients can be reached with a minimum expenditure of time and energy on the part of the physician. It also furnishes the spirit of rivalry which, in some instances, is an excellent thing.

Cohen has introduced the plan of having the patients, after a certain length of time, give talks to the others of a very informal character in which the various points in the treatment are taken up. In this way the monotony of the class is avoided, and it may also be learned whether the patient really understands what he has been told or not. Sometimes an old member of the class may be used to instruct a new one, and it often happens that this information is regarded as even more valuable when it comes from someone who is doing the same thing, than when it comes in a perfunctory way from a physician.

The results of class treatment are, as a rule, very good, and Cohen regards every ambulant patient as suitable. He does not recognize the existence of the unteachable consumptive, and has found that even careless and combative persons have been urged to do better as the result of contact with other persons suffering with the same disease. This, of course, does not correspond to the experience of most persons. When a certain grade of poverty is reached, sanitary teaching of any kind is apt to be futile.

THE USE OF TRAVELLING CAR EXHIBITS. Homan¹ has given an account of the use of a special car furnished with a tuberculosis exhibit, such as has been held in various large cities. This car is in charge of a medical supervisor and lecturer, and has been used in Missouri with the greatest benefit, enabling those in charge of the tuberculosis campaign to place before the people in the smaller towns a well chosen and comprehensive exhibit. By means of lectures and the exhibit, an

¹ Journal of the American Medical Association, September 24, 1910.

active interest in the tuberculosis campaign can be awakened in towns which otherwise would be difficult to reach. This method of instruction certainly ought to appeal to those in charge of state campaigns throughout the entire country.

VON PIRQUET'S TUBERCULIN REACTION. Mills¹ has reported his experience with von Pirquet's reaction in the surgical tuberculosis of children, and studied 48 healthy children varying in age from nine months to eleven years, and found that none of them gave the reaction. This differs with von Pirquet's own statement to the effect that about 36 per cent. of children clinically not tuberculous gave the reaction between the ages of five and eight years, and that the reaction might occasionally occur in those clinically not tuberculous even younger than this.

Mills found that he could obtain the reaction in all tuberculous cases except in certain rare exceptions, and is of the opinion that the reaction is of considerable value in surgical diagnosis. It is interesting to note that in some cases he used bovine tuberculin, and in others human tuberculin, and the reaction in both was about the same.

Bride² made a résumé of the experience in the wards of the Manchester Children's Hospital, and has come to the conclusion that the test is of great help in the early diagnosis of pulmonary tuberculosis in differentiating it from unresolved pneumonia and chronic bronchitis, also in the differential diagnosis between typhoid and abdominal tuberculosis, and in the early diagnosis of abdominal tuberculosis and also of the cause of pleuritic effusions.

They do not find it of value in cases of tuberculous meningitis, in cases of tuberculosis where some acute infectious disease accompanied it, or in cases of tuberculosis associated with much pyrexia.

BERANECK'S TUBERCULIN. Beraneck³ has produced a special tuberculin which he has used rather extensively, with more or less satisfactory results.

There are two kinds of poisons produced by the tubercle bacillus; one of these is readily soluble, the exotoxins, and these diffuse readily throughout the body. The others, the endotoxins, are closely united to the bacillus and are diffused only with great difficulty. They apparently enable the bacillus to resist the bacteriolytic action of the cells and constitute the strongest weapon in invading the tissues. The toxins of the tubercle bacillus are nothing like as toxic as those of some other organisms, diphtheria and tetanus for example. Their action is slow, the defences of the body are gradually exhausted and paralyzed, and finally a complete breakdown follows. This process of infection and intoxication is opposed by the body by the production of antibodies, and also by reinforcing the resistance of the leukocytes to the necrosing action of the tubercle bacilli, and by stimulating the bacteriolytic power of the leukocytic diastases.

¹ British Medical Journal, May 14, 1910, p. 1159.

² Ibid., May 14, 1910.

³ Edinburgh Medical Journal, December, 1909, p. 522.

With this end in view, Beraneck has reported a process of vaccination with the tubercle toxins, and he thinks, to be of use, the toxins must conform to the following conditions: They must be soluble, so that exact dosage may be possible; they must be less toxic with regard to the body's protective cells than are the toxins produced *in vivo* by the tubercle bacillus; they must be absorbed and digested by the protective cells, so that the resistance of these cells to the pathogenic action of the tubercle bacillus may be increased, and their bacteriolytic power stimulated.

Beraneck's tuberculin consists of a mixture of exotoxins and endotoxins. These are prepared on special media and by a special, although rather simple, process. This tuberculin is but slightly toxic for the normal subject and even in large doses fails to kill. It is curious to note, however, that in the tubercular subject even very minute doses produced thermal or other reactions, the reaction being noted in injections as small as 0.000001 c.c., and in certain especially susceptible patients such minute doses as 0.00000006 c.c. cannot be exceeded without a reaction taking place. This toxin must be used early, before the defences of the body are destroyed or badly injured. Theoretically, three points are to be considered: (1) Neutral doses; (2) beneficial or optimal doses; (3) noxious doses. The first are doses which are well tolerated by the patient but which have no appreciable therapeutic effect, and it is with these doses that the treatment should be commenced. The beneficial or optimal doses are well tolerated, and lead to an improvement in the tuberculous symptoms. The noxious doses are those which exceed the demands of the body and cause a rise of temperature or other reactions, and should not be used, as they injure the defensive resources of the patient. If the defensive mechanism is still able to respond to this tuberculin, it acts as an antipyretic. The proper dose can only be found by experimenting, gradually increasing the dose and observing the symptoms. If the injection is accompanied by some reaction, either general or local, it is a sign that the optimal dose has been exceeded and that smaller doses should be given.

Beraneck has used his tuberculin both in internal tuberculosis and in surgical tuberculosis accompanied by pulmonary or renal lesions, and the results have been most encouraging. He does not claim that it will work miracles, and it will not regenerate tissues that have been destroyed by tuberculous infection. The smaller the lesions and the less active, the better are the results obtained.

DIFFERENTIAL CHARACTERISTICS OF THE HUMAN AND BOVINE TYPES OF THE TUBERCLE BACILLUS. There has been so much discussion concerning this question, and it is so seldom that anything more than general results are given, that it may not be out of place to quote, from Lewis' article, the differential characteristics of the two types of bacilli.

Grown under special conditions, that is, on coagulated dog serum, the recent isolations differ in morphology. The bovine bacilli are short, straight, plump, and stain solidly. The human bacilli are longer, frequently curved, thinner, and, when stained, are often beaded. The initial cultivation of the tubercle bacillus is more difficult from the bovine than from the human source. Grown on glycerin bouillon, there are constant differences in the character of the growth. The bacilli from the human disease grow as a thick wrinkled membrane from the beginning, which tends to spread rather slowly, and thickens about as quickly as it spreads. A favorable culture of bovine origin will spread rapidly as a thin translucent membrane over the whole surface. If the culture has been long under cultivation, the membrane may thicken evenly until it is not to be distinguished from the completed human membrane. If recently isolated, either this thickening does not occur or it develops in irregular lines or spots.

Finally, the bacilli differ widely in virulence. The inoculation disease from the bovine bacillus in young cattle tends always to become general. Inoculated intravenously in small doses, the cattle usually die of acute miliary tuberculosis. If human bacilli are inoculated in similar dose intravenously, local chronic disease results at most. If the human bacilli are inoculated intraperitoneally, intrapleurally, or subcutaneously, even in large doses, only a local chronic disease results. The virulence of the two bacilli for rabbits was found to be exactly the same as for cattle.

Typhoid Fever. Next to tuberculosis, typhoid has come in for a tremendous amount of attention, and very justly so. If we had in the United States anything like the same number of deaths from a disease with which we were not familiar, such as the plague or cholera, the entire country would unite in trying to exterminate it, and yet, in spite of repeated warnings and dire experience, the public goes on in its unconcerned way, while thousands of victims are sacrificed to what ought to be a preventable disease.

Due to Koch's influence, there is a systematic and determined fight against the disease in Germany, which is perhaps the only country in which the subject has been taken in its true seriousness.

The total number of deaths caused by typhoid fever in the registration area of the United States, for the year 1909, was 10,722. The death rate from typhoid fever is lower than it was ten years ago, although it is still more than twice as large as that of England and Wales.

EXPERIMENTAL TYPHOID. Metchnikoff and Besredka¹ have reported the results of their experiments before the Academy of Sciences of Paris. By the ingestion of fecal material from a typical case of typhoid, they succeeded in producing, in a chimpanzee, a disease having the same

¹ *La Semaine Médicale*, April 6, 1910, p. 166, No. 14.

general symptoms as the human typhoid, and at autopsy showed essentially the same lesions with the addition of some of the characteristic lesions of dysentery, in the form of some small erosions of the mucous membranes of the large intestine. The blood of the chimpanzee agglutinated the typhoid bacillus in the proportion of 1 to 50,000.

ETIOLOGY. Lumsden¹ reviews the subject of the etiology of typhoid fever, on which he is particularly competent to speak after his great epidemiological studies made in Washington, D. C., during the past four years.

He states that he would be willing to estimate that not more than 25 per cent. of the typhoid fever occurring in the United States during the past twelve months has been caused by infection by the public water supply. Not that he wishes to minimize the danger of impure drinking water, which is great enough even at the figures which he quotes, but that he believes that other factors must be considered, particularly the fact that the disease is communicable from person to person. The infective agent may be effective immediately on being discharged from the bodies of diseased persons, and anything which will serve to convey living organisms from the excreta of persons with typhoid, or typhoid carriers to the alimentary canals of healthy persons may be a factor in the transmission of the disease. The most common, and therefore the most important factors in transmission are personal contact, water, milk, raw fruits and vegetables, raw shellfish, flies, and other insects. Lumsden also believes that if there be any as yet unknown factors in the transmission of the infection, their operation is prevented by the same measures which will prevent the operation of the known factors. The factors concerning individual susceptibility are as yet unknown, but, in conclusion, he believes that the bulk of evidence supports the view that the typhoid bacillus is an essential if not the exclusive factor in the production of typhoid fever.

WATER FILTRATION AND TYPHOID. Hill² has contributed an article bearing on the subject of the death rate from typhoid in Washington, D. C., and the water supply.

Without taking up the views of Hill, which consist in the belief that the vast majority of primary cases of typhoid fever in Washington otherwise unaccounted for are due to infection conveyed to them by the Washington water, it might be well to call attention to the fact that the death rate from typhoid has not been diminished by the installation of a slow sand filter. In fact, the year following the beginning of its use (1906) the death rate was higher than in the previous three years. Careful investigations of the water by the Public Health and Marine Hospital Service have been made and have not furnished any definite conclusions, but, until the filtered water used there is proved

¹ New York Medical Journal, July 9, 1910, p. 53.

² American Journal of Public Hygiene, 1910, p. 430.

to contain typhoid bacilli or the colon bacilli in larger numbers than are found in the average filtered water, one would be inclined to believe that the unexplained cases are due to some other factor than the water supply. This opinion is based on the fact that, in other States in which the death rate from typhoid has been very high, it has diminished remarkably with the installation of filtration plants. The experiences in Albany, Philadelphia, and Columbus, Ohio, may be cited as examples of this, and these can easily be duplicated by the experience in many other places. In Philadelphia, the typhoid mortality has changed from 74.8 in 1906, to 21.2 in 1909, this last being the lowest figure in the history of the city. The experience in Washington is merely another evidence of what is well known, namely, that we are not yet thoroughly informed upon the causation of typhoid fever epidemics, and it is a subject for further investigation.

THE TRANSMISSION OF TYPHOID BY NURSLINGS. Rommeler¹ calls attention to an interesting example of how typhoid may be transmitted by a class of individuals heretofore scarcely reckoned with in the fight against typhoid. There has been in Germany, under the influence of Koch, an organized systematic effort to suppress typhoid, especially in certain districts, and an especial effort has been made to study the various means by which the disease may be transmitted.

In this instance, a mother, aged twenty-six years, became ill with typhoid and was sent to the hospital. Her baby, aged one and one-half years whom she was still nursing, was placed out in another family. It was noticed some days later that the child had diarrhea. Nothing was thought of this until two weeks later, when the woman taking care of the child was taken ill with typhoid, and subsequently her three children, a three-year-old niece, and also a twenty-year-old relative. The diagnosis in the infant was made by the finding of the Widal reaction and the isolation of the typhoid bacillus.

Rommeler concludes that when a mother is nursing her child and becomes sick with typhoid, the mother and child should both be taken care of in a hospital, since it has been proved that there is danger of the transmission of the disease in such cases.

TYPHOID CARRIERS. Davies and Hall² have suggested that a register of all typhoid convalescents be kept, and frequent bacteriological examinations of their excreta made with a view to determining whether or not they are typhoid fever carriers. They also suggest the use of sufficient hygienic measures to prevent the spread of the infection in cases of individuals who are typhoid carriers.

School Children as Typhoid Carriers. According to Förster, from 15 to 20 per cent. of all typhoid cases may be caused by typhoid carriers,

¹ Münchener medicinische Wochenschrift, May 3, 1910, p. 957.

² Lancet, September 3, 1910.

and of particular importance in the spread of the disease are school children.

Brückner¹ calls special attention to the necessity of taking into account the cases of typhoid in children. First, because the disease in children has been very much neglected, and the diagnosis is often not made because the disease may appear in its lightest form, and consequently is not treated, and the child is allowed to go about if it is able to be up. This is particularly true of children between eleven and fifteen years of age who seem especially liable to develop typhoid infection, a point which has hitherto not been noted. The only way to control these cases is by organized warfare against typhoid fever, particularly the investigation of cases occurring in schools, and the careful bacteriological study of all forms of light fevers in which the diagnosis is not quite plain. This can only be undertaken with the coöperation of the bacteriological department and the health authorities working hand in hand with the general practitioner, as it means a large number of bacteriological examinations, many of which will doubtless prove negative. It seems very curious that in a disease like typhoid, which all the pediatric specialists recognize as one of the possibilities of diagnosis in the febrile affections of children, there should still remain a doubt as to its occurrence in the minds of the laity and general practitioner.

I have often been struck with the great frequency with which typhoid is found in children's hospitals in cases admitted as diarrheas, slight indigestion, or often with no special diagnosis, but a history of the child not being well and often showing only a moderate grade of anemia and a little fever.

This is only another opportunity to try to emphasize a point which has been written about and spoken about considerably of late, but which has apparently been largely unheeded by the medical profession at large.

THE SPUTUM OF TYPHOID FEVER PATIENTS AS A POSSIBLE SOURCE OF INFECTION. Tenney² has made a study of the saliva and sputum of 53 cases of typhoid fever, several of which showed bronchial symptoms, but none pneumonia or any laryngeal complications. With the technique employed, the bacillus was not found in any of these cases, but it was found that the typhoid bacillus will live one hundred and twenty-five days in the saliva and sputum, and can be readily transplanted from one specimen of such material to another, and can be kept growing in it at room temperature for a long time.

It would seem, from these studies, that the typhoid bacillus is not frequently found in the mouth in cases uncomplicated by pneumonia, but several other observers have been able to isolate the bacillus from

¹ Münchener medicinische Wochenschrift, June 7, 1910, p. 1213.

² Boston Medical and Surgical Journal, July 28, 1910, p. 124.

cases which had pneumonia as a complication. It would seem, therefore, that the sputum as a source of infection cannot be entirely disregarded.

TYPHOID FEVER IN CHILDREN. Adams¹ gives a study of 550 cases of typhoid fever in children, covering a period from 1872 to 1908. There are certainly very few practitioners now who believe that infants and young children are not susceptible to typhoid fever, however prevalent this belief may have been a few years since.

Of Adams' cases, over 75 per cent. were admitted during July, August, September, and October. The distribution of sex was similar to that in adults, 296 boys and 254 girls being treated. The ages ranged from one to fifteen years, and there was a decided increase in the number admitted after the fourth year of life.

In 43 autopsies, 17 cases of perforation were found, all being of the ileum. There were 28 deaths from hemorrhage, but in no instances could the bleeding vessel be found. The onset was insidious in 361 cases, diarrhea in 17, malaise in 14, chills in 66, and suddenly in 81. Occasionally other symptoms were noted, such as delirium, cough, vomiting, and headache. The fever terminated by lysis in 241 cases, and by crisis in 19. Rose spots are not as frequent in children, but were found in 133 cases. These figures are probably not accurate, as 20 per cent. of the cases were negroes.

Skin infections are much less common in children than in adults, and bed sores occurred so seldom that the figures were not given. Furuncles occurred in 7 cases. There was nervous disturbance in over half the cases, in most instances being a mild or what was termed a low muttering delirium. There was wild delirium in 59 cases, 8 became maniacal, 1 hysterical, stupor occurred in 12, and coma in 1. There were 8.7 per cent. of relapses, which were of short duration and of milder type than those usually seen in grown people.

Altogether the mortality rate was 11.8 per cent. In the last five years this was 7.9 per cent., which Adams believes to be due to better methods of treatment.

The *treatment* consisted in liquid diet, and, during the three decades, various methods of treatment were used. Cold sponging, cold packs, and antiseptic treatment were tried and abandoned; the antiperiodic treatment with the use of quinine was also given a trial and abandoned; the treatment with antipyretic drugs was tried for a short time, and was then most vigorously condemned. In the last half decade special attention has been paid to the nutritive value of the diet, and in many cases semisolid food has been added with benefit. The hydrotherapy used was of a mild type, being sponge baths, or packs, and,

¹ American Journal of the Medical Sciences, April, 1910, and Pediatrics, June, 1910, p. 341.

in later years, the regular Brand treatment by means of baths had been used in exceptional cases.

THE HEART MUSCLE IN TYPHOID FEVER. Hamman¹ has made a study of 43 hearts from persons dying from typhoid fever, and found some changes in practically all. In some, the lesions were not extensive enough to allow one to assume with certainty that the efficiency of the heart muscle was interfered with. There is at the present time nothing to allow one to judge of the functional capacity of the heart by the examination of the histological lesions, and it would seem from Hamman's study that the two did not always run parallel. There was no particular evidence of changes in the smaller branches of the coronary arteries, but he found frequent periarteritis and endarteritis in the large and medium-sized branches. These lesions doubtless interfered with the nutrition of the heart, and are of importance both from a standpoint of the work of the heart during the disease, and also of the future well-being of the patient.

During attacks of acute infectious diseases there are two things which especially call attention to some cardiac lesion, and these are notably irregularities of rhythm, and the physical signs of beginning dilatation. In some instances, sudden death can only be explained upon the assumption of abrupt cardiac failure. It was Romberg's opinion that failure of the circulation at the height of an infection was due entirely to vasomotor paralysis, but it would seem that the heart is often affected and cannot be entirely disregarded as a factor in such failure. Lesions in the myocardium are of particular importance during convalescence, and undoubtedly play an important role in the future health of the individual. While typhoid fever is not as hard upon the heart as diphtheria, or possibly some of the other infections, it must, however, be taken into account as a serious factor in producing chronic arterial and myocardial disease.

Hamman is of the opinion that the prevention of infectious diseases will probably prove one of the strongest prophylactic measures in the treatment against the degenerative lesions of the circulatory system.

Menard and Brodin² have written a most excellent résumé of our knowledge of this subject, taking up not only the pathological changes, but the symptomatology. They do not bring out any new points, but anyone interested in the subject will find their article of great interest.

ULCER OF THE SOFT PALATE IN TYPHOID FEVER. Ludin³ has reported two cases in which the diagnosis of typhoid was first suspected owing to the presence of ulceration of the soft palate. In one patient there was pleurisy with effusion, and in the other, a fever and slight dulness

¹ Archives of Internal Medicine, October 15, 1910, p. 339.

² Gazette des Hôpitaux, July 2, 1910, p. 1083.

³ Correspondenz-Blätter für Schweizer Aerzte, August 20, 1910, and La Semaine Médicale, October 26, 1910.

in one lung. In both, there were ulcerations on the soft palate. These ulcerations were round or oval, grayish white, the edges clearly defined and somewhat raised above the surface. Cultures from the ulcerations showed the presence of staphylococci.

These ulcerations have been described by various authors, most of whom believe that they are of pathognomonic value, but little attention has been paid to them in this country, and they are not even mentioned in the article by McCrae, in Osler's *Modern Medicine*.

TYPHOID PERIOSTITIS EIGHTEEN YEARS AFTER PRIMARY ATTACK. Van Bisselick¹ has reported a remarkable case of late typhoid periostitis showing perhaps the longest interval on record between the original infection and the periostitis. This patient was a man, aged fifty-one years, who was admitted to the hospital for a swelling of the anterior end of the sixth rib on the right side. This proved to be an abscess, the pus of which showed the presence of the typhoid bacillus, and the blood of the patient agglutinated typhoid cultures. Further questioning developed the fact that he had had typhoid eighteen years before, since which time he had been in good health, without any indication of trouble whatever.

MENSTRUATION AND TYPHOID FEVER. It is curious that while, in a general way, the effect of disease on menstruation is known, but very little has been done on the other side of the question—the effect of menstruation upon the course of the infectious diseases. I have noted above an interesting article by Welch in relation to tuberculosis.

Stengel² has published an interesting paper relating to typhoid fever. He has particularly studied the effect of the occurrence of menstruation on the onset and course of enteric fever, as the effects of a normal functional process can be better determined than those of preëxisting nervous or other conditions. He notes that when the menstrual period coincides with the commencement of the fever, the onset is often unusually severe, and especially so if the menses fail to appear. The temperature reaches a high level from the first, and, indeed, for some days may be hyperpyretic. Nervous symptoms are prominent—coldness, shivering, and extreme sensitiveness to cold, pain in the lower part of the abdomen, and sometimes hysterical manifestations are encountered. These symptoms may be repeated at the next menstrual period, whether the flow is present or not, and rises of temperature, otherwise unexplained, can be occasionally accounted for in this manner.

SKIN RASHES IN TYPHOID FEVER. Phillips³ has contributed a most interesting article on this subject, based on a study of the occurrence of rashes in 1230 cases of typhoid fever in the Lakeside Hospital, at Cleveland.

¹ Nederl. Tijdschr. voor Geneesk., August 14, 1909.

² University of Pennsylvania Medical Bulletin, December, 1909.

³ American Journal of Medical Sciences, August, 1910, p 203.

Herpes was observed in 12 cases, which is of interest, as many believe that the presence of herpes labialis excludes the diagnosis of typhoid fever. This belief has been disproved a number of times, notably by McCrae, who found herpes in 20 cases in a series of 1500 patients. *Urticaria* was present in 21 cases, in some coming on at the time of the rose spots and in others later in the disease. A *miliary eruption of sudamina* was a frequent occurrence in the third or fourth week of typhoid, due to the retention of sweat drops beneath the epithelial layer of the skin. De Lacaze believes that the appearance of sudamina in three or four weeks indicates the entrance into active convalescence, a belief which is held by Phillips and which is borne out in my own experience. Sometimes a previous desquamation follows this condition. *Desquamation of the skin* was noted in 83 cases. It follows sudamina and also follows vesicular rose spots, and there may be an atrophic change analogous to the shedding of hair, which is usually seen in cases with severe fever. Phillips adds to these the desquamation which follows an erythematous eruption in typhoid.

The *erythemas* have always been a subject of considerable attention on account of the difficulty which they add to making the diagnosis. Attention was called to these by Murchison in 1873, and the presence of a *scarlatiniform erythema* which may be limited to the flexure surfaces, or which may cover the entire body, has been mentioned by many prominent writers on the disease. It sometimes happens that a sore throat appears at the same time. True scarlet fever has also been reported complicating typhoid. *Morbilliform rashes* have also been noted, but there is a difference, in that they frequently appear first on the foot and spread upward, and there is no coryza or conjunctivitis, and the eruption is not crescentic. Typhoid fever and measles in the same patient have been reported in a number of instances. *Purpura* is occasionally noted, but is rather of rare occurrence, however. *Hemorrhagic rose spots* are not uncommon. *Gangrene of the skin* has also been noted by a number of observers. *Pemphigoid eruptions* have been observed, and under the heading of septic conditions of the skin, *furunculosis* is quite common, while *carbuncles*, *onychias*, *abscesses*, and *impetigo* may be mentioned. There is sometimes a peculiar *bluish discoloration of the skin*, usually, though not always, associated with the presence of pediculi. They are from 4 mm. to 10 mm. in diameter, of irregular outline, and most abundant about the chest, abdomen, and thighs.

A very unusual skin lesion, seen chiefly in children and young adolescents, especially when the disease has run a very long course and when the growth in height of the patient has been very rapid, is so-called *striae patellaris*. These consist of usually transverse stripes about the knees having the appearance of slightly reddish scars. They are a very marked contrast to the surrounding skin, are painless, and cause no inconvenience. They may also be noted about the ankles.

ON THE CAUSES DETERMINING THE PRODUCTION AND DISTRIBUTION OF THE ERUPTION IN TYPHOID FEVER. The eruption in typhoid fever is due to small groups of the typhoid bacilli in the superficial capillaries, and Greenhalgh¹ has called attention to the fact that the rose spots are rarely seen except in the cutaneous areas which are in direct communication by means of nerve fibers with the foci of infection, namely, the small intestine and its lymph nodes, and the spleen. These cutaneous areas correspond to those mapped out by Head, who found that they correspond to the areas supplied by the ninth to the twelfth dorsal nerves. The area for the spleen has not been definitely described, but probably has the same area as that assigned to the stomach, namely, from the sixth to the ninth dorsal nerve. The skin area, having the same innervation as the small intestine and spleen, coincides with the area to which the eruption in typhoid is, as a rule, confined.

In this reflex sign the superficial reflexes are often diminished, or even absent during the eruptive stage of the fever, and the tone of the muscles innervated from the same spinal level appears to be diminished. Over this area the pilomotor nerves are abnormally sensitive, and the goose skin reflex is more readily brought about than in health; but, curiously enough, in typhoid fever Greenhalgh did not observe an increase in this reflex. There is also a loss of vascular tone, and, in the præruptive stage of the fever, the abdomen is uniformly flushed. The tache cérébrale is especially marked in typhoid fever, and absence of the tache cérébrale on the abdomen and a diminution or absence of the epigastric and abdominal reflexes are signs of decided value in the diagnosis of the disease. Further evidence of trophic disturbance over this area is seen in the branny desquamation often noted over the chest and abdomen during the decline of the disease, and it is not uncommon to see perspiration and sudamina confined to the abdomen and chest.

Cayley has stated that he regards the persistence of the tache cérébrale in typhoid as an indication that the intestinal lesions are not yet healed, which, if true, will be of some value in differentiating cases in which the fever is continuing from other causes than the changes in the intestine.

AN INITIAL HEMORRHAGIC EXANTHEM IN TYPHOID. Curschmann² has reported a small family epidemic of 8 cases, with very interesting skin lesions. The mother and six children were taken ill almost at the same time. On the second or third day of the disease there appeared, in all 7 cases, a number of reddish-blue spots varying in size from that of a grain of buckwheat to a lentil, and these spots were especially noticeable upon the chest, shoulders, and arms. In 2 cases they were

¹ British Medical Journal, February 19, 1910, p. 438.

² Münchener medicinische Wochenschrift, February 22, 1910.

also on the abdomen. They did not disappear under the pressure of the finger, and left a yellowish-brown pigmentation, such as follows a hemorrhage of the skin. These petechiæ appeared only once, with the exception of the mother, who, upon the eighteenth day of the disease, following an abortion, had a second crop of small hemorrhages. Twenty days later the father was taken with the typhoid without any eruption, but on the eighth day there suddenly appeared on the back and thighs a very large number of hemorrhagic vesicles the size of a pea. He died two days later from intestinal hemorrhage, and the diagnosis of typhoid was confirmed by autopsy.

Huber¹ has reported three cases of typhoid in which the hemorrhages did not appear at the beginning, but during the course of the disease.

PUSTULAR ROSE SPOTS. Eggleston² has reported a case of typhoid in which there was a skin eruption consisting of small macular papules, most of which looked like the ordinary rose spot and some of which, however, contained a small vesicle containing clear liquid. Some of these vesicles attained the size of from 10 mm. to 12 mm. in diameter, and became filled with pus. The appearance of these suggested chickenpox or smallpox vesicles. Later, other rose spots came out, some of which went through the same vesiculation and pus formation. After the twelfth day of the disease there were no new spots.

The eruption was limited to the anterior part of the trunk. Examination of the pus showed the presence of the staphylococcus aureus. There was no other involvement of the skin and no acne, and the patient had not been bathed or treated with any other therapeutic measure.

The author was able to find only four other such cases in the literature. Infection of the rose spots should not be confounded with the presence of small pustules and other skin infections which are only common in patients who are being bathed.

THE VALUE OF BLOOD CULTURES IN THE DIAGNOSIS OF TYPHOID. The use of blood cultures in the diagnosis of typhoid has steadily increased. Rosenberger, in 1903, called attention to their value, and, in 1907, Coleman and Buxton published an analysis of 1602 examinations, of which 75 per cent. were positive. These were made at all stages of the disease and by different methods. These investigators advanced the theory that the disease was caused by the destruction of a vast number of bacilli in the blood, with liberation of their endotoxins, and the consequent reaction on the part of the host.

Todd³ has reviewed the recent literature on the subject and called attention to one or two very practical points. Since the introduction of the bile culture medium, in 1906, by Conradi, Kayser and others, blood cultures have been rendered much less easy and of greater value.

¹ Münchener medicinische Wochenschrift, May 10, 1910.

² New York Medical Journal, September 10, 1910.

³ Journal of the American Medical Association, March 5, 1910, p. 756.

The blood cultures and the Widal agglutination reaction are, in a certain sense, complimentary; the former becomes less reliable as the disease progresses, while the latter steadily increases in value. To illustrate this, in Coleman and Buxton's collected cases, 89 per cent. gave positive cultures in the first week, 73 per cent. in the second week, 60 per cent. in the third, 39 per cent. in the fourth, and 26 per cent. after the fourth.

Conradi called attention to the fact that large quantities of blood were not imperative, and that excellent results could be obtained by using blood from an ordinary skin puncture. Another simple method, growing out of the blood culture, is the clot culture. These have not been used much in America, but various European observers have studied the growth of bacteria on the clot resulting from the blood drawn for a culture, and Lyons, in twenty examinations, showed that the clot culture was positive in 12 cases, or 60 per cent., and the Widal in 10, or 50 per cent. The two coincided in only 5 cases, so that, by combination of the clot culture with the Widal, the diagnosis was established in 85 per cent.

The blood culture method has a definite advantage over the Widal in diagnosis also, in that, by using the cultures on certain sugars, the true typhoid and the paratyphoid bacilli may be distinguished from one another. It is also of value in distinguishing between a true relapse and febrile complication, as the bacilli disappears from the blood in convalescence and reappear in a relapse.

The time required for the reaction is within twenty-four hours. The method used is to obtain blood either from a skin puncture or vein, and place this, as soon as possible, in a test-tube containing the special culture medium. This is incubated for from six to twelve hours, and then tubes of bouillon or solidified blood serum are inoculated. These are placed in the incubator and at intervals examined by stained smears and hanging-drop preparations. If motile, Gram-negative bacilli are found, they are presumably typhoid bacilli, but further study should always be made on special media to render the identification positive. The medium used is 12 to 15 per cent. solution of Squibb's inspissated ox-gall, to which 1 or 2 per cent. of peptone may be added; this is sterilized before use.

The technique of obtaining blood from a vein is exceedingly simple, and not difficult except in children or adults with fat arms and small veins. The skin at the bend of the elbow is prepared as for any minor operation. A bandage should then be applied about the upper arm, and when the veins are distended a hypodermic needle attached to a syringe is introduced into the vein, the blood generally flowing into the syringe at once. Instead of a syringe, a glass tube which has been drawn out at the end and ground to fit a slip on the hypodermic needle may be used. Usually from 2 c.c. to 5 c.c. of blood can easily be obtained, and often more.

A NEW, SIMPLE METHOD OF TYPHOID DIAGNOSIS. Mandelbaum¹ describes a new method which gives essentially the same results as the Widal reaction, and, in most instances, the test can be made in four hours' time with a comparatively simple technique.

Pfaundler, and later Kraus and Löwe, found that, when cultures of bacilli had the homologous serum added to them, the bacteria lost their motility and then grew out into long thread-like forms and appeared either as threads which, when stained, showed that these threads were chains of bacilli, or the thread turned and twisted on itself and formed a ball. This resulted finally in the chains and bacilli falling to the bottom of the culture leaving a clear fluid above, while the chain formation went on in the sediment.

Mandelbaum, making use of this observation, added to 10 c.c. of bouillon an oese full of a twenty-four-hour-old culture of typhoid bacilli. A drop of a powerful typhoid immune serum had previously been added to the bouillon. After a half-hour, it was found that one or two bacilli could be seen here and there in the hanging-drop cultures. There was no movement and no agglutination, because the bacilli were too far apart. After leaving it in the thermostat for three hours longer, it was found that the bacilli had grown out into long chains or sometimes into balls. These were easily studied by adding an oese full of Löffler's methylene blue to the hanging-drop culture.

From this observation he evolved his method of making the diagnosis, which, for practical purposes, is carried out as follows: He uses the ordinary bouillon, to which is added 2 per cent. of sodium citrate. From 5 c.c. to 8 c.c. of this bouillon is then placed in test-tubes and sterilized in the ordinary manner. Capillary pipette tubes, such as are used in opsonin work, are then used to secure a drop of blood from the typhoid patient, and then 5 c.c. to 8 c.c. of the bouillon, with an oese full of a twenty-four-hour-old typhoid bacillus culture added, is drawn into the same tube. This is accomplished by using a small piece of rubber tubing on the end of the capillary tube in order to obtain suction. The mixture is then drawn still farther, so that the end of the pipette may be sealed in the flame. This is well shaken and placed for four hours in a thermostat at a temperature of 37° C. If the blood is from a typhoid patient, at the end of this time, in the hanging-drop preparations, the long threads above described are found present. If it is not from a typhoid patient, the bacilli are movable and separate. This was tested on 12 cases of typhoid, all of which gave a typical reaction, and also in 16 other individuals who had had typhoid at various periods up to eleven years, the typhoid reaction was positive. No individuals having had typhoid from eleven to twenty-four years were tested, but in those who had had it twenty-four or more years ago

¹ Münchener medicinische Wochenschrift, January 2, 1910, p. 179.

there was no reaction. In individuals who had had the disease a year or more previously, the reaction was positive in so far as it produced the change in the balls, but there was also present some isolated movable bacilli. A typhoid carrier who had the typhoid bacilli in his feces and who had had the disease five years previously gave a typical reaction in four hours, and, after eight hours, the reaction was similar to that just described, so that this possibly may afford an easy method of determining whether or not a person is a typhoid carrier. Individuals who had not had typhoid were examined, and, in seventy-five instances, all gave a negative reaction.

Another question of interest is whether or not, by this method, it is possible to distinguish typhoid and paratyphoid. In typhoid patients, at the end of four hours, with tubes using both typhoid and paratyphoid bacilli in the test, the result was strongly positive in the tubes with the typhoid bacilli and only faintly positive in the paratyphoid tube. At the end of twenty hours, however, the typhoid tube was still strongly positive, while the paratyphoid tubes were negative. The same character of reaction was obtained for individuals affected with paratyphoid, the paratyphoid tubes in this case being strongly positive at the end of four hours and the typhoid tubes were weakly positive, while at the end of twenty hours the diagnosis was clear. This reaction will have to be thoroughly studied by a number of different observers before it can be accepted for general clinical use, and several observers have already questioned the accuracy of results obtained by it. It would seem, however, worth while to have the subject pursued farther, inasmuch as the method is much simpler and much quicker than those in use at the present time.

ALUM BATHS IN TYPHOID FEVER. Boggs¹ has called attention to a method that has been in use in the Johns Hopkins Hospital for several years, which has rendered considerable service as a prophylaxis against skin infections. Skin infections are common in typhoid fever; boils, bed sores, and abscesses being present in a certain number of cases in spite of the best nursing. This has been attributed to a certain extent to the bathing of patients, which tends to soften the skin and render it less resistant, while the rubbing during the bath, which is essential to the best results, leads to a certain amount of irritation, particularly about the hair follicles. In order to lessen this irritation about the hair follicles, the rubber gloves worn by the nurses are covered by a mit of towelling, so as to avoid pulling the body hairs by the wet rubber.

It occurred to Boggs to try the addition of some antiseptic to the water, and, in searching for one that would be non-irritating and non-poisonous and not too expensive, he decided upon commercial alum (potassium aluminum sulphate). This is fairly soluble, has reason-

¹ Journal of the American Medical Association, June 25, 1910, p. 2124.

ably powerful antiseptic qualities, and, besides precipitating organic matter in the water, it also has a tendency to harden the skin. One pound of powdered alum is quickly dissolved in a little hot water and added to the tub in filling. With the average tub of 450 to 500 liters, this makes approximately a 1 to 1000 solution, and the cost per bath is about four cents. The patient is bathed in this solution just as in ordinary water; nothing is noted except a slight increase in the desquamation during convalescence, and a decided reduction in the number of skin complications. The same rigid care of the skin in the ordinary way is advised, in addition to the use of the antiseptic baths. The results in preventing skin infection are shown in the following table:

SEPTEMBER, 1905, TO SEPTEMBER, 1908, WITHOUT ALUM.

Cases treated.	Abscesses.	Furunculosis.	Bed-sores.	Dermatitis.	Folliculitis.	Total skin infections.	Percentage.
394	8	13	9	2	0	32	8.1

SEPTEMBER, 1908, TO NOVEMBER, 1909, WITH ALUM BATHS.

210	4	3 ¹	0	1	1	9	4.2
-----	---	----------------	---	---	---	---	-----

THE TREATMENT OF TYPHOID BY CONTINUOUS SALINE INSTILLATION. Several years ago, Cushing and Clarke suggested the use of large quantities of water in the treatment of typhoid fever, their method being to administer by the mouth a gallon or more in twenty-four hours, the water being given in small definite quantities at stated intervals. The results of this method were to greatly increase the flow of urine, to lessen the nervous symptoms and also the toxic appearance which is so often present. The general symptoms of typhoid are probably due very largely to the presence of the toxin in the blood, and this toxin is not like that of tetanus, being secreted by the bacillus itself, but is an endotoxin and is usually derived from the dead bodies of the typhoid bacillus.

Riesman² believes that there is another factor, and that is, on the one hand, the waste products from the excessive cell formation, especially in the lymphoid tissues during typhoid, and, on the other, from the cell destruction. As regards the opinions of others, it is extremely desirable to promote elimination, and to this end he has been led to try Murphy's method of continuous enteroclysis. By this method it is possible to introduce remarkable quantities of fluid into the system, but Riesman has not attempted to go beyond one-half to one gallon per day. This method has been described by its inventor as follows:

¹ Six cases are excluded in which patients received only sponge baths without alum.

² Journal of the American Medical Association, January 29, 1910, p. 374.

The patient is placed in the Fowler position. The apparatus in its simplest form consists of a fountain syringe or can with a large rubber tube attached, terminating in a vaginal hard rubber or glass tip flexed at an obtuse angle two inches from its tip, having numerous openings in its bulbed end. The tip should be inserted into the rectum so that the angle fits closely to the sphincter, and the tube may then be bound firmly to the thigh with adhesive strips, so that it may not be expelled. The bag or can is suspended from the foot of the bed, so that its base is about six inches above the level of the patient's buttocks. Once the irrigating apparatus is thus placed, it need not be disturbed for several days unless to increase or diminish the speed of influx. The solution, consisting of a dram each of sodium chloride and calcium chloride to the pint of water, is now placed in the reservoir and kept at a temperature of 100° F. by applied heat in the form of hot-water bags, thermolytes, or an incasing can of hot water. The quantity administered depends on the severity of the case, the age of the patient, and other considerations that will suggest themselves in the particular instance.

The best plan is to place a pint and a half of the saline solution in the container every two hours. The container should be elevated sufficiently to allow this all to flow into the rectum in forty to sixty minutes, giving the rectum approximately an hour's rest before the influx of fresh fluid.

This method has been used by Riesman for two years with some slight modifications. The patients were left in bed in the ordinary position, the solution used was the normal salt solution without calcium chloride, and, as a rule, the instillations were omitted during the night; in some cases it was interrupted even during the day. The patient should be under observation to see that the fluid is being absorbed, as the accumulation of water in the bowel is not to be desired in the later stages of the disease. The results of this treatment are similar to those obtained by the administration of water by mouth, that is, the increase in the flow of urine and the lessening of the nervous symptoms. It probably does not lessen in any way the length of time which the disease runs, but both Riesman and his assistants in the hospital have a high opinion of it as a method of treatment.

TURPENTINE ENEMATA IN THE TREATMENT OF ENTERIC FEVER. Arnold¹ calls attention to a method of treatment which he has used over a period of some four or five years, and which he believes has certain advantages in lessening symptoms and possibly shortening the average duration of the disease.

This treatment consists in the use of enemata of turpentine and olive oil from the first day until the temperature has been normal for at least ten days. When the case first comes under observation, an

¹ British Medical Journal, July 23, 1910, p. 195.

enema of 1 ounce of turpentine and 1 pint of olive oil is given by a funnel and tube; the foot of the bed is well raised and the emulsion is allowed to find its way slowly up the bowel. Following this, $\frac{1}{2}$ ounce of turpentine with somewhat smaller amounts of olive oil are administered on alternate days throughout the course of the disease. He states that this method is particularly useful in getting rid of disagreeable abdominal symptoms due to the presence of intestinal contents or to tympany.

THE INFLUENCE OF IODIDE OF POTASSIUM AND ARSENOUS ACID ON THE TYPHOID BACILLI IN CONVALESCENTS. Tsuzuki and Ishid¹ have studied an epidemic of typhoid occurring in an artillery regiment at Kokura, Japan, with a particular view to finding some drug which would influence the typhoid bacilli remaining in the body. The convalescents were divided into three classes: One received iodide of potassium; the second, arsenous acid; and the third, no treatment. In the untreated cases the typhoid bacilli disappeared from the urine and stools on an average of fifty-nine days. Those treated by iodide of potassium, on an average of forty-two days, and those treated by Fowler's solution, on an average of thirty-four days. They concluded, therefore, that both these drugs exerted some influence upon the typhoid bacillus, and the arsenic preparation was more efficacious than the iodide.

ANTITYPHOID VACCINATION. The importance of antityphoid vaccination seems to be making slow but steady progress. The necessity for such vaccination for armies is very well shown by the number of cases which have occurred in recent wars. In the Civil War, there were some 80,000 cases in the Northern army alone; in the Franco-Prussian War, in the German army there were over 73,000 cases, with 8789 deaths, and about 60 per cent. of the total mortality of the Franco-Prussian War was due to typhoid. In the Spanish War, we had 20,730 cases, with 1580 deaths in an army of 120,000, or one case for each 5.6 men; 86 per cent. of all the deaths in this war were due to typhoid. The success obtained by Haffkine in the cholera vaccinations in India, and the experimental work of Pfeiffer, who showed that it was not necessary to inoculate the living cultures into animals, but that the antibodies could be produced by the injection of killed bacteria, led both Pfeiffer and Wright to study the question of vaccination in man.

Pfeiffer and Kölle, in 1896, reported 2 cases which they had vaccinated and studied very thoroughly, and in the same year, Wright reported 2 cases of his. In 1898, the method was used in a great many of the men going to the Boer War, but no exact figures have been published from this experiment, although it appears that, in about 19,000 men who were immunized, the incidence of typhoid was about half as much

¹ Deutsche medicinische Wochenschrift, September 1, 1910.

as in the unvaccinated and the death rate in these was diminished about two-thirds. There was considerable opposition to the vaccinations in the English service and they were discontinued in 1902, but were recommenced in 1904 after an investigation by a Commission, the present work being carried on by Leishman and Harrison. Since then, in 5473 vaccinated men there were 21 cases of typhoid fever with two deaths, and in the non-inoculated, 6610 men, under the same conditions, there were 187 cases of typhoid and 26 deaths.

In this connection it is interesting to compare the following table showing the incidence of typhoid fever in India (Leishman¹):

ENTERIC FEVER IN INDIA FROM 1890 TO 1909.

Year.	Admissions.	Deaths.	Ratio per 1000 of strength, admissions.	Case mortality per 100.
1890	1254	332	18.6	26.50
1891	1343	380	20.3	28.29
1892	1506	374	22.1	24.83
1893	1402	370	20.1	26.39
1894	1486	408	20.9	27.49
1895	1544	383	22.6	24.81
1896	1795	445	25.5	24.79
1897	2050	556	31.8	27.12
1898	2375	657	36.3	27.66
1899	1392	348	20.6	25.00
1900	970	289	16.0	29.79
1901	776	202	12.8	26.03
1902	1012	260	16.7	25.69
1903	1366	292	19.6	21.38
1904	1384	265	19.7	19.15
1905	1146	213	16.1	18.59
1906	1095	224	15.6	20.46
1907	910	192	13.1	21.10
1908	998	191	14.6	19.14
1909	616	112	8.0	18.18

Russel² has made a study of the immediate results of the administration of 3600 doses of the vaccine. It is not necessary to use a virulent or fresh culture in making typhoid vaccines. It is necessary, however, to select one which will produce large quantities of antibodies when injected into men and animals. The culture is grown on agar slants for about twenty hours and the growth washed off in a small quantity, about 2 c.c., of normal salt solution. The two culture tubes are of uniform size with the same quantity of agar and slanted in a uniform way. They are inoculated with a uniform quantity of a broth suspension of a twenty-hour growth. Before making the vaccine the tubes are carefully examined, and any which do not come up to the standard

¹ Journal of Tropical Medicine, July 1, 1910, p. 197.

² Johns Hopkins Hospital Bulletin, March, 1910, p. 83.

are discarded. The emulsion of the culture is shaken up and a sample taken and counted for the number of bacteria, and it is also tested as regards its purity. It is then placed in large tubes holding 50 c.c. each, which are sealed in the flame of a blow-pipe. These tubes are then placed in a water bath which is so constructed as to have an equal temperature throughout of 60° C. The tubes are kept submerged for seventy-five minutes, and it takes about fifteen minutes for the tubes of this size to reach the temperature of the bath. After the cultures are killed, this concentrated emulsion is diluted to about 15 c.c. to 20 c.c. for each agar slant, sometimes more or sometimes less, so as to give a product containing one billion bacteria to the cubic centimeter. One-quarter of 1 per cent. of tricesol is then added, and the vaccine sealed in small glass ampullæ. The vaccine is tested as to its sterility, and administered to a guinea-pig and a mouse before being used on human beings. The necessity for this precaution having been demonstrated in the plague experience in Manila, and with tetanus in India. They have kept vaccines for fifteen months in an ice box, and this has been found to be just as effective as when freshly prepared. The dose of vaccine is followed by a local reaction which varies with the size of the dose and the idiosyncrasy of the individual. Usually within six or eight hours there is a red tender spot about the size of the palm of the hand at the point of inoculation. This increases for about twelve hours and then gradually subsides, disappearing entirely in from two to three days. Sometimes, especially in children, there may be no local reaction, but on the other hand, there may be a very marked amount of redness, pain, and sometimes swelling of the lymph nodes in the axilla. A small hard nodule is found at the seat of inoculation and this disappears in about one or two weeks without giving rise to any symptoms. The general reaction is variable, in children and in many adults there is no reaction whatever. In many cases the reaction is mild, headache lasting from a few hours to a few days, sometimes there is marked headache and languor, and very occasionally slight nausea or diarrhea. In moderate reactions there is a rise of temperature, 101° to 103°, but this does not occur very often. Occasionally there is a very severe reaction with a temperature over 103°, with chill, headache, nausea, and vomiting. It seems that, in a man who has had typhoid, there may be a moderate or a severe reaction, but the factors which determine these severe reactions are not known beyond this. It is not known definitely how long the immunity lasts, but apparently it lasts for three years or over, which, so far as armies and epidemics are concerned, gives ample time for all practical purposes. There seems to be no question that vaccination protects to a very great extent against the disease, and that it is of great value in armies and in individuals who are going to be exposed, such as nurses and physicians in hospital services.

Russel does not agree with the statement that vaccinating should not be carried on in the presence of an epidemic. He considers it a safe and simple means of combating the incidence of the disease.

VACCINES AS A METHOD OF TREATMENT IN TYPHOID. Leishman¹ considers that there is a possibility of considerable good in the use of typhoid vaccine as a therapeutic measure, and at his suggestion Captain Smallman treated a number of cases of the disease, with unusually good results. They began with small doses and found that up to 50,000,000 the vaccine had no evil effect, and also had no good effect. Upon raising the dose to 300,000,000 or 400,000,000, and repeating it every four or five days, much better results were obtained. There was a reactionary rise of temperature of from 1° to 1.5° F., followed by a considerable drop the following day. The temperature remained comparatively low for two or three days after the inoculation.

There was a remarkable improvement in the general appearance and condition of the patients treated, some of the soldiers asking for a repetition of the injection. Of the 36 cases treated, 2 died, and there was an unusual freedom from relapse and complication in the remainder.

This method of treatment has been tried before in this country, in Germany, and in India, and it requires further study before being recommended as a method of treatment. It is very probable that it is a step in the right direction, the greatest difficulty being the question of appropriate dosage.

MIXED INFECTIONS OF TYPHOID AND PARATYPHOID B. Popp² has reported a case of mixed infection which is very rare in the literature. The attack started after eating oysters, and for the first sixteen days the case had the general appearance of a paratyphoid B infection. Then the appearance began to resemble an ordinary typhoid, and a blood examination gave a reaction to both the typhoid bacillus and the paratyphoid B, but not to the paratyphoid A. The disease lasted one hundred and four days in all, including one relapse, and the patient finally made a good recovery notwithstanding numerous complications, among which may be mentioned intense sweating, great nervousness, persistent singultus, slight nephritis, and an endocarditis with an embolus in the right ankle.

Typhus Fever. A NEW BACILLUS IN TYPHUS FEVER. Prewtetchensky³ has described a short bacillus, resembling the plague bacillus somewhat in its morphology, which he succeeded in isolating from the venous blood of cases of typhus fever, and which he also succeeded in growing in bouillon and afterward in other forms of culture media.

Without going into details of the cultures which were of technical interest, it is interesting to note that the agglutination reaction could

¹ Practitioner, September, 1910, p. 288.

² Münchener medicinische Wochenschrift, March 15, 1910, p. 585.

³ Prakt. Vrach, April 4, 1910; La Semaine Médicale, July 27, 1910, p. 355.

be determined in dilutions of 1 to 40, and were absent in the blood from other diseases. The bacillus is pathogenic for monkeys, rabbits, and guinea-pigs, large doses usually causing death in twenty-four hours with marked changes in the liver and spleen. When smaller quantities of the bacillus were used in rabbits and guinea-pigs, a continued fever was produced without any special localizing symptoms. The organisms, recovered from the organs of the inoculated animals, showed the bacillus to be capsulated.

In view of the fact that all of the bacteria heretofore described as being the cause of typhus fever have been proved not to have any relation to it, further reports concerning this new organism will be needed before it can be regarded as the cause of the disease.

THE TRANSMISSION OF EUROPEAN TYPHUS FEVER. Nicolle¹ has given a detailed account of his experimental researches in the transmission of typhus fever which were undertaken at Tunis during the year 1909. He was able to transmit the disease from human patients to a chimpanzee by injections of the blood, and from a chimpanzee he was able to transmit the disease to the macacus monkey, but was unable to transmit the disease from the human being directly to the macacus. He was also able to transmit the disease from macacus to macacus by means of the ordinary body louse. It would seem that the virus becomes attenuated in the monkey, and that injections from the first ones resulted in what were considered abortive attacks of typhus, attacks which rendered the animal immune. This adds another to the growing list of infectious diseases that are transmitted by insects and lead to the implication of the body louse in the transmission of tabardillo.

Vaccines in Acute and Chronic Otitis Media. These have been used by various observers with more or less variable results, and this method of treatment may be thought of in the acute cases wherever the disease shows a tendency to be prolonged, and may also be used with great benefit in the chronic cases, and in those in which there is a tendency to repeated relapse. Of course, where there is necrosis of the bone, in these latter cases, operation will have to be considered and will probably be necessary in such cases.

Christie² has reported most favorable results in most of the cases which he has had under his care. In the acute cases there is usually one predominating organism, the *Staphylococcus pyogenes aureus* or *albus*, the *Bacillus pyocyaneus*, or others. The autogenous vaccines were used by Christie in the strength of 250,000,000 to the cubic centimeter, the first dose being 0.5 c.c., and, when this can be given without producing any local or general reaction, it is repeated in five days' time

¹ Annales de l'Institut Pasteur, April, 1910, p. 243.

² Journal of the American Medical Association, February 26, 1910, p. 705.

or, if there is a reaction, the second dose is delayed until a week has elapsed. When 0.5 c.c. can be given without any reaction, the dose is increased to 1 c.c., and this continued at weekly intervals until a cure is accomplished.

In the chronic cases, where there is sometimes a mixture of several organisms present, Christie advises a plating of the cultures, the growing of these separately, and then the mixing of vaccines containing a definite number of the organisms in equal proportions, the advantage of this method being that a more or less complete dosage of each organism is thus secured which is impossible when several organisms are grown together, owing to the tendency for one to outgrow the others. The time necessary in plating and growing the cultures is, of course, of comparatively little importance in these chronic cases.

Bronchitis Due to Vincent's Streptothrix. Rothwell¹ has described the infection of the tracheal and bronchial mucous membranes by the streptothrix described by Vincent in connection with cases of ulcerative membranous angina.

The patient was a girl who was taken suddenly ill with what was supposed to be a pneumonia. There was high temperature, intense pain, constant coughing, and profuse bloody fluid sputum. The breathing and the cough suggested a combination of asthma and croup. There were no lesions in the mouth or throat. The streptothrix was demonstrated in the sputum. The disease after lasting some ten days gradually cleared up. After three weeks' time the patient was able to be about, but some weeks later upon any special exertion she would have a certain amount of bloody sputum, containing the organism. It was several months before this finally disappeared.

Epidemic Generalized Vaccinia. Hill and Ross² have reported an epidemic of generalized vaccinia which had several remarkable features.

Generalized vaccinia is of exceedingly rare occurrence, and, as a rule, may be dismissed with the statement that it is of no particular importance. There may be spontaneous eruptions, or the eruption may become more or less generalized by auto-inoculation. In the former case, it is not uncommon to see a small crop of vesicles in the immediate neighborhood of a primary vesicle, and very exceptionally there may be a true generalized pustular rash, beginning between the eighth and fourteenth days, in which secondary pox may continue to appear for five or six weeks. This last condition may at times prove fatal in children.

The epidemic reported consisted of 425 cases in which there were 31 deaths; 363 of the cases and 28 of the deaths occurred in the cool districts of Natal, while 62 cases and 3 deaths occurred in the warm

¹ Journal of the American Medical Association, 1910, p. 1867.

² Journal of Hygiene, August, 1910, p. 137.

ones. The eruption may be classified into three groups: (1) In 20 per cent. a generalized eruption appeared simultaneously all over the body from about the fourteenth to the twenty-eighth day after vaccination, and, in many cases, after the scab had fallen off. (2) In 75 per cent., secondary vesicles appeared around the original vesicle on about the eighth day, followed by crops in various parts of the body for the next two months, and, in some cases, even for three months. (3) In the remainder, an eruption followed one of the preceding types, then subsided altogether to reappear a month or two later after some ailment or burn.

In the first group, the eruption appeared as small macules which were surrounded by a slightly reddened area, but the hard, shotty feeling which is characteristic of the smallpox papule was not observed. The macules changed in two or three days to vesicles, umbilication was frequent, and on about the eighth day they became pustular and secondary fever appeared. The eruption appeared on the mucous membrane of the mouth, gums, palate, and pharynx. The eruption was noted particularly on the forehead, neck, and crown of the head, but often confluent on the front of the neck, less on the thorax and back, and scanty or absent from the abdomen. It was usually more extensive upon the vaccinated than on the other arm. It appeared upon the palms of the hands, the soles of the feet, and was profuse upon the thighs and ankles. The general appearance was that of varioloid. In the fatal cases, there was bronchopneumonia during the course of the illness, or as a terminal affection. Diarrhea occurred in some, and the children passed into an asthenic condition and died of exhaustion. Death occurred only in the late stages of the condition, as early as five weeks after vaccination, and some as late as three months.

Lymph from the vesicle on the foot of one child was inoculated upon a calf, when it produced typical but not vigorous vesicles. The lymph was obtained from one source only, and about three-fourths of the persons attacked were vaccinated from a parcel bearing one number, which would indicate that it came from one particular calf, but the total amount of lymph was evidently taken from six different calves, which suggests a particular quality that was inherent in the strain of lymph and not in the reaction of any particular calf. It was also probable that the reason more cases occurred in the cool districts than in the warm, was that the lymph underwent changes due to the exposure to a higher temperature.

Whooping Cough. Guerassimovitch¹ has noted the fact, which has already been commented upon by Weill and others, that a child with whooping cough late in the disease, even when mingling intimately with other children, is not liable to transmit the disease. This is probably due to the fact that the whooping cough germs disappear early

¹ *Vratch*, July 4, 1910; *La Semaine Médicale*, September 7, 1910, p. 431.

in the expectoration, and confirms one's belief in the pathogenicity of the organism as described by Bordet and Gengou.

The same author calls attention to the fact, which is liable to be overlooked, that there may be light cases of whooping cough or atypical cases, particularly among adults, which may pass unrecognized and which act as a source of infection. Among other cases he cites one of a woman, aged thirty years, who was taken with coryza, slight fever, and a cough, which was mistaken for an attack of la grippe with laryngitis. After about two weeks, the cough became very much less, and finally disappeared. Some fifteen days after the disease began in the mother, the two children began to cough, and at the end of ten days the diagnosis of whooping cough was made. These children had not been exposed to the disease in any manner, and it was believed that the so-called la grippe was really an atypical whooping cough. One such case in a single child could, of course, with little difficulty infect a great many children.

CHOKED DISK WITH BLINDNESS IN WHOOPING COUGH CURED BY TREPHINING. Nacht¹ has reported a very unusual case of a child, aged seven years, who had scarlet fever and measles, and was in the sixth week of whooping cough when complete blindness developed. The pupils were dilated, the left eye did not react at all to light and the right but slightly, and there was still a vague perception of light in the right eye. Lumbar puncture was done without success.

On account of the opposition of the parents, the trephining was not done until five days after the beginning of the blindness. A small opening was made in the left frontal region, and there was an abnormal quantity of cerebrospinal fluid present. The pia mater was normal, and there was apparently no internal hydrocephalus. Considerable fluid escaped from the wound during the first three days. There was no change in the condition of the patient until the third day, when a candle light could be perceived at 25 cm. by the right eye and this improvement continued for about two weeks, when the vision of the right eye was practically normal, and that of the left eye had returned to about half normal. The eye grounds at this time were practically normal.

Apparently, in this case, the optic neuritis was due to pressure caused by the excessive amount of cerebrospinal fluid.

THE BACILLUS OF WHOOPING COUGH IN THE BLOOD. It will be remembered that Bordet and Gengou, about four years ago, described a small bacillus as the cause of whooping cough. This bacillus had the general appearance of the influenza bacillus, and was found, especially during the first two weeks, in the sputum from the bronchial tubes. This observation has been confirmed by others, and Klimenko² suc-

¹ Klinische Monatsblätter für Augenheilkunde, May and June, 1910.

² La Semaine Médicale, 1908, p. 407.

ceeded in reproducing the disease experimentally in monkeys and young dogs. This last observer¹ has continued his studies, with particular reference to the presence of the organism in the blood. He made a study of 30 children, between the ages of three months and nine years, all suffering with whooping cough. The blood was examined during the first to the seventh week of the disease. During life in none of these cases could the bacillus be demonstrated, but, in 3 cases that died, it was found in the blood of 1, post mortem. The autopsy was made some twenty-six hours after death and it is possible that its presence in the blood was more or less accidental. In 57 cases of experimental whooping cough in young dogs, his experience was as follows: In 10 animals, the blood was examined during life; 12 were sacrificed during the height of the disease, and 35 died as a result of it. In the last two classes, the blood was only examined after death. Of the animals examined during life, the organism was not found in the blood, but it was found five times at autopsy, and in these 5 cases the lesions were very severe, but it must be noted that, in 5 other cases where the lesions were just as severe, the blood was sterile.

These experiments of Klimenko seem to show definitely that the whooping cough bacillus does not ordinarily circulate in the blood, but that it is probably limited to the mucous membrane of the respiratory tract.

Experimental Yaws. Nichols² has made a study of experimental yaws in rabbits and in monkeys, and has proved what was believed before, that the disease is not identical with syphilis, although the lesions in man bear many striking resemblances. The surest way to differentiate the organism is by the comparison of the lesion produced by syphilis and yaws in the monkey. In yaws, the incubation is two to three weeks, the lesion is elevated, slightly scaly, and very edematous. In syphilis, the incubation is about four weeks, the lesion is flat, dry, and very scaly. The spirochete of yaws has been called *Treponema pertenue* and is slightly thicker than the spirochete of syphilis, less rigid, and less regular in its twists. The complement fixation reaction may be observed in rabbits infected with the spirochete of yaws, as well as those infected with the spirochete of syphilis. Rabbits may be easily infected in the testicle, infection showing enlargement and the presence of nodules varying in size from a pea to that of an olive, with necrosis, infiltration of round cells, and edema. This lesion makes possible the investigation of problems concerning the cultivation, immunity, and treatment of yaws which have heretofore baffled investigators.

As noted above, yaws, or frambesia, is among the diseases success-

¹ Vrach, January, 1910, and La Semaine Médicale, June 29, 1910, p. 304.

² Journal of Experimental Medicine, September, 1910, p. 617.

fully treated by the use of Ehrlich and Hata's dioxydiamidoarsenobenzol.

Yellow Fever. It is well known that in countries where yellow fever is endemic the native population enjoys a very considerable degree of immunity to the disease, and that foreigners, after having resided in yellow fever countries for some time, apparently acquire a certain degree of immunity. Foreigners who have recently taken up residence in infected districts are most liable to be attacked.

There is not much known concerning this acquired immunity. Manson and others have suggested that it is probably owing to mild attacks of the disease, possibly occurring in childhood, which have rendered the individual immune, as it is well known that second attacks of yellow fever are exceedingly rare.

Simond, Aubert, and Noc¹ have reported an epidemic of yellow fever in the Island of Martinique, in 1908 and 1909. Before this outbreak yellow fever was supposed to have been entirely absent from the colony for a period of nine years or over, and it was proved that there had been reinfection from without. These observers found that there had been for many years a fever known locally as inflammatory fever, attacking children and occasionally adults, and frequently being a comparatively slight ailment. Sometimes there were severe acute attacks, especially in adults, and these were accompanied with jaundice, occasionally black vomit, and albuminuria. The authors think that this disease is really true yellow fever, and are of the opinion that yellow fever is ordinarily a mild disease, and that the severe attacks, such as are described in the text-books, are of comparatively rare occurrence. If this is true, it will explain the fact that many individuals living in the tropics become immune to yellow fever, they really having had an attack which in most instances has passed unrecognized. They are also of the opinion that heat and moisture not only favor the increase in mosquitoes, but that they intensify the virulence of the yellow fever virus.

These observations should lead to further study of these mild febrile diseases occurring in yellow fever districts, and this may throw considerable light upon this perplexing problem.

¹ Annales de l'Institut Pasteur, 1909, Nos. 11 and 12.

DISEASES OF CHILDREN

By FLOYD M. CRANDALL, M.D.

DURING the past year, poliomyelitis has received more attention from the pediatric writers of this country than any other subject. The infectious diseases of childhood have also received a large share of attention. All of these diseases are considered in other sections of this volume. Eliminating these subjects, the pediatric literature of the last year has been comparatively meagre in amount and commonplace in character. Considerable has been written on prevention of disease in early life, and the hygiene of infancy and childhood has received some attention. Southworth¹ contributes an excellent article upon the role of pediatrics in preventive medicine. He points out the importance of nutrition in infant life, and lays stress on the fact that the child must be kept alive, and must be suitably nourished as a preliminary to every other effort made in its behalf. He refers to the lamentable results of neglect, and the enormous opportunities for control over the growing organism. The trite phrase that "as the twig is bent, the tree is inclined," has no truer application than to the youthful body. Pediatrics has reduced to a science the methods of training during this formative period of human life. Extensive as is the debt we owe to the laboratory and to the coöperation of other specialties, gratefully as we acknowledge their aid in combating disease and in insuring to the rising generation a better equipment for their struggle, nevertheless, the earliest and the ultimate responsibility falls on the children's physician, for to his hands they are confided by their parents, and on his judgment reliance is placed, not only to deal with the present, but to detect and remedy conditions and tendencies ere they assume a harmful or serious phase.

Infant Mortality. The question of infant mortality has been the subject of much thought among pediatric workers for several years. During the last two years it has attracted particular attention, and has received extended comment in these pages in the last two editions.² No more significant phase of the world-wide movement of preventive medicine is evident than the formation of the American Association for the Study and Prevention of Infant Mortality in 1909. Organization was effected after a conference held in New Haven, and the first

¹ Journal of the American Medical Association, July 16, 1910.

² PROGRESSIVE MEDICINE, March, 1909, p. 167; March, 1910, p. 195.

meeting was held in Baltimore in November, 1910. The conditions which lead to a high mortality rate during infancy are many and complex, and it seems certain that this organization is destined to accomplish much.

An excellent report upon the work of the third International Congress of School Hygiene, held in Paris in August, is made by Duenas,¹ of Havana. An exact and definite knowledge must precede efficient efforts of prevention. Close study of many of the factors which underlie the terrible loss of infant life will certainly put into the hands of the profession weapons which they do not at present possess. While much may be done by boards of health and other public agencies, the saving of child life rests with the general practitioners of the country more than with any other class. From them must come largely the education and training of mothers which is so essential.

This movement in preventive medicine is by no means limited to America. In Germany an institution for the repression of infant mortality has been opened in Charlottenburg. The Empress is Protectress of the work, and \$400,000 has been raised for its support. The object, as described by Grinnan,² is as follows: (1) The practical and scientific investigation of questions pertaining to the nutrition and care of infants, as well as the care of mothers. (2) The collection of data on infant mortality, and the organizations for the care of infants in the German Empire and other civilized countries. (3) To make the results of scientific and practical investigations available to the public by its publications, and to offer information and counsel to officials, and to public and private associations as well as private individuals.

Educational work in reducing infant mortality is described in detail by W. C. Phillips,³ secretary of the New York Milk Committee. This instruction is of three kinds: (1) Home instruction by nurses; (2) class instruction by doctors; (3) combined class and home instruction. The class instruction is of special interest to physicians. What may be accomplished by this method, in which emphasis is placed mainly on prevention by education rather than on scientific feeding alone, has been demonstrated by Dr. I. S. Wile at the committee's milk depot in Bloomingdale Guild, who talks to about thirty mothers of various nationalities at his weekly meetings. As each baby is weighed and examined he comments on its condition, either praising the mother for the manner in which she has followed his instructions, or criticising her for indifference or neglect. These remarks are accompanied by advice and instructions suggested by such incidents or circumstances as may happen to arise, as, for instance, the need of household as well as personal cleanliness, suggested by a dirty baby; the danger of over-

¹ Archives of Pediatrics, September, 1910.

² Pediatrics, March, 1910.

³ Journal of the American Medical Association, July 9, 1910.

dressing, suggested by the long red flannel bandages enveloping an Italian baby; the value of breast feeding, suggested by remarkable gains in weight of a child recently taken off the bottle; the danger of crackers, sugar, beer, tea, etc., suggested by the anemic condition of a child fed on those articles. This information delivered week after week in an entertaining way has wrought a great change, not only on the mothers themselves, but on the whole character of the neighborhood in which Dr. Wile has worked. Of course, not all the mothers listen all the time, but the total effect of the work is of great value and shows what can be done by a real teacher in work of this description. The value of the visiting nurse in such work is urged by Herrman.¹

The prevention of infant mortality from an educational standpoint is considered by Royster,² of Norfolk. The influence of race on infant mortality is the subject of an article by Cabot and Ritchie.³ They found that, in Boston, deaths from digestive troubles and also from stillbirths were excessive in the Jewish race. The Italians suffer particularly from the infectious diseases, especially pneumonia. They lose less, however, than any other class from congenital weakness and birth accidents. The Irish suffer less than Jews or Italians from birth accidents and infectious diseases. Those denominated as "Americans" lose fewer children per thousand births than any other race. The advantage holds good in every particular except for the conditions classed under the term "prematurity."

The reduction of infant mortality is the subject of an exhaustive article by Holt.⁴ It is based upon a prolonged study of statistics obtained from various cities, particularly New York. Of deaths during the first year of life, 28 per cent. are due to acute gastro-intestinal diseases, 25.5 per cent. to marasmus and prematurity, and 18.5 per cent. to acute respiratory diseases. The acute infectious diseases cause the insignificant proportion of 5.4 per cent. Statistics show that it is whooping cough from which infants, during the first year, should be particularly protected. A certain proportion are lost as the result of premature birth, malformations, or unavoidable accidents. Those which may be called hopeless cases make up not more than 25 per cent. of the total. The remaining 75 per cent. die from what must be considered in a large measure unnecessary causes. Holt believes that these causes may be summed up in general terms as poverty, ignorance, and neglect. Prevention must come chiefly through proper housing, isolation, medical treatment, proper feeding, and care. Artificial feeding *per se* cannot be considered a large factor in infant mortality, as demonstrated by the small proportion of deaths among the artificially

¹ Archives of Pediatrics, September, 1910.

² Journal of the American Medical Association, August 20, 1910.

³ Boston Medical and Surgical Journal, February 17, 1910.

⁴ Journal of the American Medical Association, February 26, 1910.

fed babies among well-to-do people; but add to artificial feeding bad surroundings, lack of maternal care, neglect, bad milk, bad methods of giving good milk, and the use of improper articles of food, and a large death rate is inevitable. Artificial feeding requires not only good food, but care and intelligence. The education of mothers is, therefore, a factor of great importance, as well as good food.

An admirable article by Coit,¹ on factors in the conservation of child life, considers the subject under six headings: (1) Healthful parentage; (2) the natural elementary trio of pure air, pure water, and pure food; (3) healthful habitation; (4) early care; (5) intelligent training; (6) instruction in school.

Loss of Weight in the Newborn. It has been the accepted belief that the physiological loss of weight after birth is due in certain measure to tissue destruction. Hirsch² reports investigations made upon a series of cases in which the amount of meconium passed was carefully ascertained. He concludes that the loss of weight is not greater than the actual loss of meconium, and necessarily concludes, therefore, that there is no loss from tissue destruction.

Hemorrhagic Disease of the Newborn. This grave condition, variously known as *hæmophilia neonatorum* and *melæna neonatorum*, has received some careful study during the last three years, and some remarkable results have been obtained in treatment. Schwarz and Ottenberg³ report some important investigations of the physiology and pathology of blood clotting. Proof seems to be ample that these hemorrhagic diseases of the newborn are due to delayed or lost power of coagulation. This is a most important clinical fact. The author believes that this loss of coagulating power is probably due to destruction of, or interference with, reproduction of thrombokinase. Bacterial infection is the most frequent underlying cause of the disease, but it may be due to syphilis alone.

Treatment has been most unsatisfactory and a large proportion of patients have died. The administration of gelatin, calcium, adrenalin, and general hemostatics rarely resulted in saving the life of the patient. Injection of saline solution, while often giving some temporary relief, does not stop the hemorrhage. The injection of animal serum produces hemolytic action of a damaging type. A real and remarkable advance was made about three years ago when Carrell, of the Rockefeller Institute, saved the life of the child of a New York physician by *direct arterial anastomosis*. As the result of work done on animals he ventured to unite the radial artery of the father with the popliteal vein of the infant and thus directly transfused human blood. The result was brilliant in the extreme. The operation has since been performed

¹ Archives of Pediatrics, October, 1910.

² Berlin. klin. Wochenschrift, January 1, 1910.

³ American Journal of the Medical Sciences, July, 1910.

upon several patients, one of the last cases being reported by Mosenthal.¹ The introduction of human blood not alone fills the depleted vessels, but restores the coagulating power. There are unfortunately serious drawbacks. The operation is a most delicate one, and it is rare that a sufficiently skilful and experienced operator can be obtained. Brilliant as the results have been, the operation cannot be made generally available.

An important and very practical advance upon direct transfusion is apparently the *injection of the serum of human blood*. Some most valuable and practical observations are the subject of a preliminary report by J. E. Welch,² of the New York Lying-in Hospital. Having in mind the almost uniform failure of drugs in this connection and the possibility of producing serum sickness by using the serum of a different species, he decided to attempt the use of normal human serum. In January, 1909, he made his first injection into a bleeding baby, and now reports a total of 12 cases with 12 recoveries. In the 18 cases which had occurred previous to this treatment there had been 17 deaths. He commonly uses doses of 10 c.c., repeated three times a day if the bleeding is moderate. When the bleeding is severe, it is given every two hours, and in larger doses. It is important to begin treatment at the first indication of bleeding, however apparently insignificant. Blood is easily collected. The apparatus which Welch devised consists of an Erlenmeyer flask with a rubber stopper with two holes. Through one hole is fitted a U-shaped glass tube, to the outer end of which is attached a short aspirating needle. Through the other hole a fusiform glass tube is inserted. It contains cotton to prevent contaminating the flask contents, and has a rubber suction tube fitted to it at its upper end for drawing the blood into the flask. The needle is inserted into a vein at the elbow, and the desired amount of blood is withdrawn. The blood is allowed to coagulate and the serum is withdrawn as rapidly as it separates and is then ready for use.

In the absence of apparatus, it seems quite feasible to withdraw the blood into any sterile vessel and use the serum as it forms. These cases are usually so desperate that a means of treatment which offers so much hope should certainly be utilized, even if the details cannot all be carried out with laboratory precision. A point of importance in the use of human blood serum is pointed out in an editorial article,³ namely, the rapid gain in weight and the fact that the serum is physiologically a perfect food. It is suggested that it may prove a valuable treatment in starving children, wasted by acute disease, upon the path of recovery.

¹ Journal of the American Medical Association, May 14, 1910.

² American Journal of the Medical Sciences, June, 1910.

³ Archives of Pediatrics, September, 1910.

Sclerema and Edema Neonatorum. Pathological examinations upon three cases of edema neonatorum are reported by Schridde.¹ The pathological picture was that of primary edema. A gelatinous material was found in the edematous area. Fluid was found in the peritoneal, pleural, and pericardial cavities. There was myeloid infiltration of the liver and spleen, which were enlarged, as well as the mesenteric glands. Many myelocytes were found in the bone marrow, and very large numbers of erythroblasts. Myeloblasts and myelocytes were found in the blood, but there was a scant number of polymorphonuclear leukocytes or lymphocytes.

The *treatment* of this condition by the use of oiled silk is advocated by Dufour.² His aim is to maintain the body heat. Since adopting this method, tendency to this condition has disappeared in his hospital service. The results have been better than by the incubator treatment in premature infants. Others have used oiled silk upon the portion affected, but Dufour wraps the child completely, leaving only its head protruding.

Jaundice in the Newborn. Several illustrative cases of this condition were presented at a society meeting by Morse,³ who said that jaundice in the newborn, although in the vast majority of cases merely a manifestation of the condition known as icterus neonatorum, may be due to a variety of causes, some of them very serious. Knopfmacher's explanation of the origin of icterus neonatorum is the most satisfactory. No treatment is indicated. *Septic infection of the newborn* is far more common than is generally believed and jaundice is not an uncommon symptom. There is no justification for setting apart the cases with jaundice and cyanosis under special names, such as Winckel's or Buhl's disease. Diagnosis from icterus neonatorum is made principally on general condition, temperature, and the presence of bile in the urine. Jaundice from congenital obstruction and obliteration of the bile ducts is rather more common than is usually supposed. In this condition, the stools are gray or white at birth, or as soon as the meconium is passed, and do not contain bile. The urine does contain bile. "Catarrhal" jaundice is very unusual at this age, but sometimes occurs. Diagnosis from congenital obliteration of the bile ducts is often difficult, but can be made on the absence of enlargement of the liver and spleen. Jaundice sometimes occurs in connection with a syphilitic interstitial hepatitis. In this condition the liver and spleen are both much enlarged, and other evidences of syphilis are almost invariably present. The so-called congenital icterus, in which babies are born jaundiced and remain jaundiced throughout life, the jaundice and its cause having little or no effect on the general condition or the expectancy of life,

¹ Münch. med. Wochenschrift, February 22, 1910.

² Bulletin de la Société de Pédiatrie, February, 1910.

³ Archives of Pediatrics, March, 1910.

is very uncommon, only 14 cases having been reported. The etiology is very obscure. Diagnosis cannot be made in the first few weeks. Jaundice also occasionally occurs in the newborn, which cannot be explained by any of the conditions mentioned, and which in some cases is not satisfactorily explained even after the postmortem examination.

The Urine in Infancy and Childhood. It has been taught that the appearance of albumin and casts in the urine of the newborn does not indicate organic disease of the kidney. It would be, no doubt, more correct to say that their presence does not necessarily indicate disease. Marre¹ asserts that albumin in the urine of the newborn indicates, to a certain extent at least, a pathological condition. Habitual congenital albuminuria he regards as always grave, and is usually seen in the children of mothers who have suffered during pregnancy with albuminuria. It is certainly a fact that albuminuria secondary to general infection is not uncommon even in nurslings. Goldsmith,² of Pittsburg, reports the transient appearance of *casts* in large numbers in the urine of a child, aged eleven months, without any cause which could be detected. The child seemed to be in perfect health.

Indicanuria in young children is the subject of an article by Sill,³ of New York. He asserts that he found indican present in varying amounts in a considerable number of cases of infectious disease. In almost all of these cases there was a heavily coated tongue, foul breath, and bad stools. The more prominent the toxemic symptoms, such as headache, fever, and vomiting, the greater was the amount of indican found in the urine. As the symptoms improved, the indican became less and less, until it finally disappeared. It has been demonstrated by numerous careful observers that indol is always produced by bacterial putrefactive changes acting upon the proteid of the ingested food. Vegetable proteid is less likely to be acted upon in this way than animal proteid, on account of its cellulose covering. This, therefore, is an argument in favor of a cereal and vegetable diet in these cases.

According to Porter, proteid elements are nearly always undergoing putrefactive decomposition in the alimentary tract when indican is present in the urine, and even the slightest trace of indican is abnormal. As a result of these putrefactive changes in the alimentary tract, toxins are formed and absorbed into the general circulation, causing innumerable symptoms by their action on the nervous system, such as headache, nervousness, irritability, dizziness, nausea, and vomiting. Two or three symptoms were prominent in these cases—namely, furred tongue, foul breath, more or less fever, loss of appetite, and usually constipation. The following symptoms may be present: jaundice; pain over the liver, stomach, or abdomen; wakefulness, anemia, malnutrition.

¹ Revue d'Hygiene et de Médecine Infantiles, No. 2, 1910.

² Journal of the American Medical Association, January 8, 1910.

³ American Medicine, November, 1909.

Errors in diet and improper oxidation of the food are responsible for this condition in the vast majority of cases. All food has to be oxidized before it can be assimilated and goes to make tissue. Suboxidation products, when found in the urine, are indications of faulty metabolism. This is due to faulty living and feeding, in the vast majority of cases.

The most efficient *treatment* is to thoroughly clear out the alimentary tract with calomel, followed by a saline, and that by rhubarb and soda, three times a day. In some cases dilute hydrochloric acid will be found valuable, given three times a day, and also from one to three drops of tincture of nux vomica. Eating between meals should be prohibited, and no candy or sweets should be allowed. The diet should be restricted first to cereals, cereal gruels, and a small amount of stale bread and butter. Fruit, such as the juice of oranges, baked apple, and later fresh vegetables may be given. Special symptoms require special medication. When this condition occurs with any of the contagious diseases, the special disease must be treated along the lines indicated for that particular disease in addition to the therapeutic measures pointed out for the indicanuria.

While these observations have been recounted at considerable length, I am obliged to say that my own experience makes me agree with the opinion of Morse, referred to in another place, that there is at present a tendency to attach too much importance to the presence of indican in the urine.

Pyelitis. The occurrence of pyelitis in young children is more common than many practitioners realize. Many a case of persistent intermittent fever would be cleared up by an examination of the urine. Grey,¹ of East Orange, calls particular attention to the fact that but few diseases yield so readily to treatment as pyelitis. Urotropin rarely fails to give rapid results. One-half to one-third grain every two hours during the day is a suitable dose for young children. Older children, he asserts, may have two grains every two hours during the day time only. This treatment seems more rational, and Grey asserts has been more effective than the alkaline treatment. A fatal case of *toxic pyelitis* in a female infant of eighteen months is reported by Neuhoof,² of New York.

Enuresis. In an extended article upon this subject, Wachenheim,³ of New York, unreservedly adopts the theory that enuresis is a tic or habit spasm. He believes that the adoption of the term incontinence of urine has introduced confusion, and shrouded a simple matter in a haze of obscurity. The word incontinence designates a symptom, while the term enuresis is a very suitable one for a neurosis of which

¹ Journal of the Medical Society of New Jersey, February, 1910.

² New York Medical Journal, September 10, 1910.

³ Ibid., February 5, 1910.

the cardinal symptom is incontinence. Among the features which link enuresis with the convulsive tics is the undeniable element of habituation. (1) It reveals itself as a tic in being almost continuous; the bladder tends to empty itself whenever a small quantity of urine has accumulated. The predominance of nocturnal incontinence is due to the absence of distracting influences during sleep, for it is well known that a habit spasm is temporarily suspended when the patient's attention is directed thereto. (2) There is the frequent association of enuresis with such unquestionable habit spasms as stuttering. (3) The age of onset agrees exactly with that of the other habit spasms; the ages of maximum frequency also correspond. Its lesser tendency to persist into adult life is due to its involving the genito-urinary tract, which undergoes such radical anatomical and physiological changes at puberty. Furthermore, some cases of enuresis, especially in females, do persist into adult life, and then become exceedingly difficult to cure, as also happens with other tics.

Successful *treatment* of tics consists in making the patient perform voluntarily, under his own or some other person's control, the movement which has been so frequently repeated subconsciously. In carrying out this plan, the child is compelled to urinate at regular hours during the day, and is awakened at regular intervals during the night, the intervals being timed so as to anticipate the involuntary act, if possible. Thus, in a moderately severe case, micturition might be enforced upon rising, at nine, noon, three, six, at bedtime, an hour after bedtime, and two hours after bedtime; bad cases may require a two-hour interval during the day, and more arousings at night.

The essential matter is the accurate observance of the exact hour day by day. Often the training cure by itself proves ineffective, a common complaint being that the child is found to be wet every time it is aroused, the tic being fully developed and practically continuous during the sleep. Here we may aid by cutting off all fluids during the latter part of the day and the evening, thus reducing the secretion of urine to a minimum by keeping the bladder as nearly empty as possible. Atropine has a certain adjuvant value, and may be given rather liberally, for small doses are useless. When the tic is associated with a run-down condition, tonic treatment is indicated. When adenoid vegetations or greatly hypertrophied tonsils are present, their removal is indicated; but a conspicuous effect on the enuresis need not be expected, save that the operative shock or the anesthesia may check it as it may any habit spasm. It is wise to continue the training for a considerable time, at least two months, after the incontinence has ceased. The nocturnal arousings may be omitted after about a month, but the strict observance of the diurnal evacuations should be continued at least a month longer.

Herrman,¹ of New York, accepts the principle that in enuresis we are dealing primarily with a psychical disturbance, which may very well be compared to stuttering. In the latter the vocal and respiratory organs are normal, but the patient does not know how to use them properly. The patient with involuntary micturition has perfect organs, but lacks the proper control of the mechanism, and like all patients with tics, he lacks especially the power of inhibition. It, therefore, seems that a method which has been successful with tics might be equally successful in the treatment of enuresis. The reëducational treatment of tics consists in having the patient perform voluntarily, a number of times, the muscular action which he performs involuntarily and unnecessarily; that is the so-called method of conscious repetition of Brissaud. Scripture puts it as follows: "The tic is carried out by mental activity of less than full consciousness; the entire act may have become subconscious. Perfect voluntary imitation of the act trains the mind to do exactly the same act consciously. Thereafter the act is no longer an involuntary subconscious one, but a voluntary conscious act. The tic has been killed." Applying this method to involuntary micturition, Hermann has the patient urinate at regular stated times, but every time he is directed to void a little, say 2 drams, and then stop; then void 2 drams more and stop, and so on until the bladder is emptied. In this way he exercises the mechanism which controls urination; he trains and educates himself in the voluntary execution of the act. After this has been done two or three times under the direction of the physician, the patient can carry it out by himself.

McCready,² of Pittsburg, asserts that there are some cases in which the administration of thyroid extract will not only relieve enuresis, but will cause a marked improvement in the physical and mental condition.

Status Lymphaticus. This subject has been exhaustively considered in these pages twice during the last three years.³ Less has been written upon the subject during the last year. One of the most extended articles is that of Cocks,⁴ of New York, who considers the subject with particular reference to the occurrence of sudden death. His conclusions may be summarized as follows: (1) The thymus gland is probably an epithelial organ with an internal secretion. (2) The diagnosis of status lymphaticus as a cause of sudden death is made too frequently. Hammar's statistics show that the thymus gland is normally much larger than is generally supposed. (3) Mechanical tracheostenosis undoubtedly exists as a cause of death in rare instances. (4) The usual cause of death in status lymphaticus is probably a hyper-

¹ Archives of Pediatrics, August, 1910.

² Journal of the American Medical Association, November 5, 1910.

³ PROGRESSIVE MEDICINE, March, 1908, p. 193, and March, 1909, p. 208

⁴ New York State Journal of Medicine, July, 1910.

thymization of the organism, which renders it peculiarly susceptible to external harmful influences, such as shock, anesthetics, and infectious disease. (5) The x -ray offers the most certain and reliable means of determining the presence or absence of an enlarged thymus gland. (6) If status lymphaticus exists, chloroform is the most dangerous anesthetic.

Rachford¹ describes the x -ray treatment of status lymphaticus. Although no portion of the body was exposed to the rays except the thymus gland, he asserts the following as the result of the treatment: (1) Decrease in the size of the hyperplastic thymus, with the disappearance of the cough, stridor, and asthma. (2) Decrease in the size of the enlarged spleen and lymph nodes. (3) The exhaustion and general feebleness of constitution gives place to normal conditions of health and strength, and physical and intellectual growth are greatly stimulated. (4) A rapid disappearance of the marked lymphocytosis which characterizes this disease. (5) Excessive physiological action of the thymus gland is controlled.

Since the above remarkable results are brought about by the action of the x -rays on the thymus gland, it would appear that the excessive physiological activity of the thymus gland bears the same relationship to status lymphaticus that excessive activity of the thyroid gland bears to exophthalmic goitre. One seems justified in inferring from the facts that the exciting cause of true status lymphaticus acts primarily on the thymus gland, commonly producing marked hyperplasia with an increase in, or perversion of, its internal secretion, and that this internal or increased secretion is responsible for the general hyperplasias of lymphoid tissues, the lymphocytosis, and general feebleness of constitution which occur in this disease. The general hyperplasia of lymphoid structures, as well as all the other symptoms of status lymphaticus, disappear when the x -rays reduce the thymus to normal size and, perhaps of more importance, to normal functional activity.

Premature Infants. The results of substitute feeding in the case of 125 premature infants are described in great detail by Maynard Ladd.² These children were treated without incubators, and were fed with careful modifications of cow's milk. From these observations the following conclusions may be drawn: (1) The total mortality was 65.6 per cent. in 118 out of the 125 babies weighing under 2100 grams at birth. (2) No infant weighing under 1200 grams at birth survived. (3) No infant in the sixth month of gestation survived. (4) The smallest baby weighed 570 grams at birth, and lived six days. (5) The possibility of materially lowering the mortality by providing proper means of conveying premature infants to the hospital is very great. (6) Premature babies who survived gained on an average only

¹ American Journal of the Medical Sciences, October, 1910.

² Archives of Pediatrics, June, 1910.

50 grams a week on modified milk, for an average period of seventy days each. (7) The average energy quotient of the food of 11 cases who lived and gained in weight was 107. (8) There was no definite relation between the energy quotient of the food and the weekly gain in weight. (9) Modified milk carefully administered and supervised must be considered an unsatisfactory food for premature infants, and should be used only when breast milk cannot be obtained. (10) Hospitals planning to receive premature infants should make ample provision for the maintenance of wet-nurses. (11) The relative value of padded cribs and incubators could not be accurately judged, as modern incubators have not been used at either the Infants' or Children's Hospital in Boston.

Milk as an Infant Food. The modern infant is defined by G. Stanley Hall as a parasite of the cow. There is enough truth behind this statement to make it worth repeating. One editor,¹ accepting this statement, makes a plea for more respectful treatment of the cow. There can be no question that the cow is treated with more consideration than she was a few decades ago. This improvement has not been due so much to regard for the animal as regard for the human being, particularly for the human infant.

A few years ago I introduced into this article a section on "Infant Foods." The above heading is the more correct, however, as current medical literature now contains but few references to any artificial infant food except milk. In a judicious and carefully written article on proprietary and predigested foods, Howland,² of New York, states that it is not a narrow view to take that predigested medicinal foods have no reason for existence, that proprietary infant's foods are unnecessary, and that in pediatrics we can almost entirely dispense with ferments. Whatever the actual practice of physicians may be, medical authors and writers recognize but one artificial food, namely, milk. With that tendency I fully agree, and feel that if it were thoroughly followed in practice, the infants of the country would be extremely fortunate.

During the year an admirable circular was issued by the United States Department of Agriculture³ upon the dissemination of disease by dairy products and methods for prevention. It consists of five papers: (1) Milk as a carrier of contagious disease. (2) The importance of a wholesome milk supply. (3) The relation of the tuberculous cow to public health. (4) Interpretation of results of bacteriological examination of milk. (5) Pasteurization, its advantages and disadvantages. These papers are an admirable presentation of some of the most important questions in the production of wholesome milk.

¹ Medical Review of Reviews, July, 1910.

² Journal of the American Medical Association, January 15, 1910.

³ Bureau of Animal Industry, Circular 153.

The circular may be obtained by application to A. B. McIvin, Chief of the Bureau of Animal Industry at Washington.

The occurrence of bacteria in bottled milk has been studied by Torrey and Rahe,¹ who find that the two upper ounces of cream usually contain from 50 to 100 per cent. more bacteria than do the lower two ounces. This apparently results from the upward rafting power of the fat globules. More bacteria are found in the upper layers of rich milk than in those of poor milk. In milk kept at low temperature the rate of bacterial increase in the cream and the lower milk is virtually the same. At higher temperatures, the rate of increase in the lower milk is even greater than that in the cream. In the average bottle of fresh milk, the lowest strata, which contains the sediment, not infrequently shows less bacteria than any other portion of the bottle. An excess of bacteria in the bottle, if marked, indicates that the milk is either old, or has been kept in a warm place. An index to the bacterial content of milk is described by Sarthou,² who states that it is largely employed in the Netherlands. The amount of bacteria is gauged by the amount of oxygen liberated in 40 c.c. of milk treated with 10 c.c. of solution of hydrogen dioxide at from 20° to 25° C.

Three articles of particular importance on the subject of milk have appeared during the year—one on clean milk by Goler,³ of Rochester, who has done so much for better conditions; one by Health Commissioner Lederle,⁴ of New York, on the future milk supply of large cities from a sanitary standpoint; and another by Howell,⁵ of Dayton, upon bottled milk as a health measure.

PASTEURIZED MILK. A subject of much discussion during the last year or two has been the pasteurization of milk. In some respects it has been an unfortunate and unprofitable discussion, for the participants have acted largely at cross-purposes, and in many cases have seemed to utterly misapprehend the point. Misunderstanding has largely arisen regarding the question of commercial pasteurization. Several prominent authorities, who believe strenuously in home pasteurization, do not believe in pasteurizing milk in large quantities to be used after a considerable interval after the operation. Some of them have been much misunderstood, and the whole question has been unnecessarily clouded, as most subjects are which fall under the ban of yellow journalism. It is an unfortunate tendency of the American character to swing from one extreme to another. All authorities are agreed that the ideal milk is safe raw milk. There are but two questions, therefore, for discussion, namely: Can we obtain a safe raw

¹ *Journal of Infectious Diseases*, May, 1910.

² *Bulletin de l'Académie de Médecine*, April 12, 1910.

³ *Archives of Pediatrics*, June, 1910.

⁴ *New York State Journal of Medicine*, March 19, 1910.

⁵ *Ibid.*, April 9, 1910.

milk for the feeding of infants? If not, is milk injured by heating, and to what extent, and to what temperature? These questions are admirably answered by Freeman,¹ of New York, one of the highest authorities on the subject in this country. He makes an assertion, to which all will agree, that the infants in New York and of other large cities can be fed today on a much safer raw milk than was possible ten years ago, but he questions the extent of this element of safety.

The *danger of tuberculosis in milk* may be said to be fairly eliminated by well-aired, well-ventilated cow stables, and by the repeated tuberculin test. But tuberculosis is one of the lesser dangers in milk. The diseases concerning the spread of which we have the most tangible and incontrovertible proof are typhoid fever, diphtheria, scarlet fever, and epidemic sore throat. Our sanitary dairies do almost all that is possible to protect us from these diseases, but epidemics may still occur from the sale of certified milks. No system of control can protect a milk supply from a mild walking typhoid, or a typhoid carrier among the employees, unless regular bacterial examinations are made of the urine and feces of the employees at frequent intervals; and no such system could at present be advocated. Diphtheria has apparently been spread by the best of our milk supplies. Virulent diphtheria bacilli exist in the throats of many healthy persons, and no supervision could be practically enforced which would protect the milk from a beginning diphtheria or a healthy diphtheria carrier. The same arguments apply to other diseases carried by milk.

The opinion has become current in this country that heated milk produces poorly nourished children; that it causes rickets and scurvy; that it kills the life of the milk, and that it produces chemical changes in the milk which render it less nourishing. It may be stated that these opinions prevail in this country and not abroad, and in matters dependent upon clinical and hospital observations we are not superior to our confrères in Europe. This opinion began to prevail in our country at a time when milk was sterilized at a boiling temperature, sometimes for two days, adopting laboratory methods. The idea was given concrete form chiefly by an article published in 1891. It soon became evident, however, that a boiling temperature was not necessary and that lower temperatures were sufficient to kill the *Bacillus tuberculosis* and the other organisms feared in milk, so that we gradually began to use lower temperatures. Instead of a boiling temperature of 212° F., 175° F. for twenty minutes was used, and later 155° F. for thirty minutes, while we now know that 140° F. for forty minutes will afford security.

The opinion that boiled milk causes malnutrition in children is well answered by the fact that European physicians have used it for the last twenty or more years without making a similar observation.

¹Journal of the American Medical Association, January 29, 1910,

After scurvy had first been diagnosticated by Northrup and the clinical picture clearly painted, many cases began to be reported, and as this was at a time when milk was being sterilized, a good many patients were fed on heated milk. But it was doubtful if the heated milk was the cause of the scurvy. Out of 356 cases collected and studied by the American Pediatric Society in 1897, 60 per cent. were fed on proprietary foods, 19 per cent. on sterilized cow's milk, 3.3 per cent. on breast milk, and only 4.5 per cent. on pasteurized milk.

From these figures, therefore, we get very little to indicate any responsibility on the part of heated milk in connection with scurvy, while, on the other hand, we have the experience of physicians abroad who feed their babies on boiled milk and who have seen much less scurvy than has been seen in this country. Our scurvy developed at a time when milk was fed in extreme dilutions, and after illness when the food was still further reduced. The original milk depots of Paris, founded in 1892, still dispense to babies milk heated to 115° C. (239° F.), which is absolutely yellow from the conversion of sugar into caramel, and in the long history of these milk depots but one case of scurvy has been observed.

Another disease said to be caused by the heating of milk is rachitis, a disease which Freeman thinks has but little connection with feeding, the main etiological feature being insufficient fresh air, for it is a disease of cold climates only, develops only in winter, and is most marked in those races which have been accustomed to outdoor life all the year around. It occurs with all sorts of food.

Freeman thinks that commercial pasteurization, which consists in heating milk to a high temperature for a few seconds, should be condemned. It is used for the purpose of keeping dirty milk sweet until it can reach the consumer. It should be insisted that the milk be produced in a cleanly manner, so that it will keep sweet until it reaches the consumer. Some city milk is so dirty that it is heated at the dairy and again after it reaches the city, so as to prevent its becoming sour before it is delivered. Such milk should be poured into the gutter and not allowed to be sold as pasteurized milk. The only safety for the consumer is to get his milk sweet and raw. Having obtained it, he should pasteurize it by using the smallest amount of heat compatible with safety. A temperature of 140° F., but little higher than the temperature at which one can bear one's hand, if continued for forty minutes with the milk in a closed nursing bottle, is sufficient to kill all the bacteria that we know and fear in milk, at the same time, changing neither the taste, nor, so far as we know, the chemical composition, or the ferments of the milk. Such pasteurization should still be used by the physician who is conscientious in his endeavor to secure the safety of the infant he is feeding.

Tonney,¹ director of the municipal laboratories of Chicago, in an excellent article on milk and tuberculosis, asserts that the diseases transmitted by milk in the order of their importance are as follows: (1) By far the most deserving of attention is the group of infantile diarrheal diseases, which are responsible for about one-third of the death rate among children under two years of age in our large cities. As to the bacteriology of these conditions, we have but little satisfactory knowledge, but the evidence furnished by vital statistics is convincing in establishing the important relation of milk thereto; (2) typhoid fever, the relation of which to milk supplies is now well understood; (3) tuberculosis; (4) scarlet fever; (5) diphtheria; (6) a group of miscellaneous affections not particularly important in this country, such as cholera, foot and mouth disease, milk sickness, and others.

As tuberculosis may be eradicated by strict application of the tuberculin test, so may these other affections be eradicated by a strict observance of sanitary rules in the production and handling of milk. But the enforcement of such rules, as in the case of elimination of tuberculosis from the herds, is a time-consuming proposition, involving an educational campaign and an adequate inspection system. The public is entitled to immediate protection while the process is going on, and for this immediate protection we must turn to pasteurization. There is certainly no other agency of purification of milk supplies which is of such wide applicability. That compulsory pasteurization is practicable for towns and cities under proper supervision by health authorities will, Tonney thinks, soon be established and generally recognized from the experience of Chicago.

Breast Feeding. The fact is pointed out by Findlay² that we do not fully understand the beneficial effect of breast milk, but it seems certain that it contains some particular element essential to the well-being of the infant. We have at least learned the impossibility of humanizing cow's milk, or any other artificial food. We can never be certain that an artificial mixture will prove a satisfactory substitute for the child's natural food. It is our duty, therefore, to insist on breast feeding in every possible case, and to utilize every means within our power to conserve the breast milk and enable the mother to feed her own child.

In considering the nursing mother from the baby's standpoint, Myers,³ of Milwaukee, refers to three errors into which nursing mothers frequently fall. The first of these is irregular and too frequent nursing. The second source of error is overfeeding, in which mothers frequently indulge in an effort to make the milk richer and more abundant. One phase of this error is seen when an excess of fluids is taken by the mother during the first few days of lactation, before the milk secretion is

¹ Journal of the American Medical Association, October 8, 1910.

² Glasgow Medical Journal, February, 1910.

³ Pediatrics, July, 1910.

well established and before the child is vigorous enough to thoroughly empty the breasts. Under these conditions various degrees of engorgement are encountered, sometimes amounting to temporary discomfort, at other times resulting in inflammatory processes leading to mammary abscess. The third frequent error is the lack of care on the part of the mother in the selection of her own food, especially shown in the too early or too abundant use of fruits and vegetables. It is a mistake to assume that errors of this character will always make themselves manifest in the form of colic. They usually do, but not invariably. Sometimes the baby will suffer no discomfort, but the character of the stools will be abnormal, or their number may be increased.

There is no particular in which the digestive systems of infants show greater differences than in their tolerance of fruit and vegetables in the mother's diet. No general rule can be laid down; each case must be studied individually. In the study of the individual case from this point of view the chemical analysis of the milk gives no information whatever. The clinical picture and the results of adding or withholding different articles of food in the mother's diet are the only dependable guides to a solution of this problem. The mucous membranes in time undergo a process of habituation or hardening, so that substances which at first produce a severe reaction eventually produce little or no discomfort. For this reason articles of diet which might cause great distress at three weeks may be perfectly safe when the baby is three months old.

In studying insufficient lactation, Fock¹ reports observations among the native tribes of South Africa. Here the children are sometimes nursed for two or three years, and even more, and a mother unable to nurse her child is unknown. It is suggested that these facts give weight to Bunge's theory that the power to secrete milk in a mother is diminished in proportion to the amount of alcohol consumed by her father. That theory may seem plausible abroad, but it does not explain conditions in America.

As a result of study of stomach contents and motility, Heiman² calls attention to the following interesting results observed in breast-fed infants: (1) The large amount of milk taken at one nursing by many newborn infants. (2) The fact that practically the same quantity of gastric contents was obtained at the end of one hour as at the end of one-half hour, and that at the end of two to two and one-half hours $\frac{1}{2}$ to 3 c.c. could still be recovered. (3) The fact that the total acidity was practically the same at the end of one hour as at the end of one-half hour. (4) The absence of free HCl in all cases. (5) The demonstration of pepsin on addition of HCl in all of the one-hour specimens, and in all but four of the one-half-hour specimens. (6)

¹ Münch. med. Wochenschrift, 1910, lvii, 1338.

² Archives of Pediatrics, August, 1910.

The presence of rennet in two-thirds of the cases. (7) The presence of lactic acid in one-half of the cases.

In the case of bottle-fed infants: (1) The stomach was found empty at the end of two hours in 4 out of 13 cases, and in 5 out of 9 cases at the end of three hours. (2) In contrast to the breast-fed infants, there was an increase in the total acidity from one-half to three hours in most cases. (3) The presence of free HCl in 2 cases, seven and eight months of age respectively. (4) Pepsin was present in only 6 cases. (5) Rennet was demonstrated in all but 2 cases. (6) Lactic acid was present in all but 3 cases.

These data differ in many respects from those recorded in previous studies. One cannot escape the impression of the noticeable lack of uniformity in the results yielded by most of the previous investigations, and the lack of standards available for clinical purposes. It remains for future studies to place the clinical value of gastric analysis of the infant on as firm a basis as is that of the adult.

Artificial Feeding. As compared with many former years, the literature of infant feeding during the past year has not been large. Very little that is original is to be found, and it must be confessed that in infant feeding we are practically where we were a year ago. The caloric method of feeding has received some attention, as well as the use of acidified milk. A year ago I¹ devoted an unusual amount of attention to infant feeding, as the literature of the preceding year had been unusually voluminous. Pritchard,² of London, presents a very good but rather diffuse article on common errors in infant feeding, in which he earnestly advocates the conserving of the breast milk. Schlossmann³ expresses the opinion that, in the endeavor to avoid overfeeding, there has been a tendency of late to underfeed. He does not believe that the proper weight can be determined by the weight of the infant but rather by the surface area, a rule which does not seem to offer a very perfect guide in practice. He advises against the administration of too much fluid to a baby, and believes that no more should be taken than a normal breast-fed child would receive.

The *caloric method of feeding* has been the subject of several articles. It should be used to determine rather the quantity than the quality of the mixture, but such has not always been the case. The limitations of the caloric method of feeding are well presented by Chapin.⁴ A calorie is the quantity of heat required to raise the temperature of one liter of water 1° C. The source of this heat is immaterial. It may result from the burning of coal, gas, cereals, sugar, meat, or other food-stuff; or it may be obtained from electricity, chemical action, by friction,

¹ PROGRESSIVE MEDICINE, March, 1910, p. 217.

² Pediatrics, June, 1910.

³ Archiv für Kinderheilkunde, 1910, liii, Nos. 1 and 3.

⁴ Medical Record, May 28, 1910.

or from the rays of the sun. It has been assumed that because all animals and human beings give off heat, their food requirements can be determined by the quantity of heat they excrete. No animal or person could live more than a few hours unless the heat liberated as the result of the chemical activities of the body or metabolism was excreted. It is a waste product to a great extent, and in summer time there is more heat produced than is needed to maintain the proper heat of the body, and the getting rid of it then is often such a serious problem that temporary abstinence from all food is sometimes necessary to reduce the production of heat as much as possible. If an animal excreted enough heat to raise the temperature of one thousand liters of water 1° C. in twenty-four hours, it might be assumed that food was needed which would yield an equal amount of heat, or one thousand calories. In cold weather, when it is needed to help maintain the body temperature, and clothing is also needed to prevent too rapid diffusion of heat, such an amount of food could be safely given. But in hot weather, when the heat is more than is needed to keep up the temperature of the body, the number of calories excreted is not an indication of the food requirements from the standpoint of heat value. Less heat is desired, and, if it was practical to employ it, continual starving would be the ideal method of handling all cases in hot weather; in the tropics no food whatever would be necessary if heating value were the sole factor that made food necessary.

From the heat-producing standpoint, coal, gas, wood, fat, sugar, and cereals are equally valuable, as all will burn and produce heat, but that the heat they are capable of producing is an indication of their food value, or that they are interchangeable according to heat values is at once seen to be absurd. In selecting food, a number of factors must be considered. First of all, is the food digestible by the particular individual? Food for a cow is entirely unsuitable for a dog, and the food of an adult will kill an infant. Yet such foods are nutritious and digestible in their proper spheres. Fats, sugars, starches, and meats will all produce heat, and all are digestible. If infants or adults needed food for the heat or caloric value alone, it would be immaterial what article of diet was employed; but foods that are of equal heat-producing value, and which are also digestible, are not interchangeable for different individuals, and growth and tissue repair do not depend upon the storage of heat, but upon the assimilation of protein.

In infant feeding particularly, where growth or the storage of protein is the chief phenomenon of nutrition, the main point to be considered is not, will the food supply heat, but is it capable of causing growth? Heat or calories are not retained in the body, and if the amount of food needed is to be determined by the amount of heat excreted, the amount of food required will be that which when burned will produce

exactly as much heat as is excreted. If only as much is taken in as is given off, there can be no storage of proteid or growth. The amount of food necessary for growth, therefore, cannot be determined by the amount of heat excreted. For roughly comparing the heat values of mixed diets, which prove suitable for the particular case from the digestive standpoint, and to act as a sort of check, the caloric values of the foods may serve a useful purpose.

Heubner gives the following caloric requirements for infancy: First three months, 100 calories per kilo of body weight; second three months, 90 calories per kilo of body weight; after that until the end of the first year, 80 calories per kilo.

Langstein-Meyer gives the following caloric needs:

1 to 2 weeks	107 calories per kilo of body weight.
13 to 14 weeks	91 calories per kilo of body weight.
25 to 36 weeks	83 calories per kilo of body weight.
37 to 44 weeks	69 calories per kilo of body weight.

The usual percentage system as applied in this country gives a very close approximation of the caloric needs as they have thus been worked out.

An excellent exposition of the caloric method of infant feeding is given by Blauner.¹ One of the chief advantages of the caloric method, he asserts, is the avoidance of overfeeding. It endeavors to feed the child with only just sufficient volume of artificial milk of any desired dilution so that its nutritive value is equal to the child's energy waste in a certain specified time, and calculates its unit of energy in terms of calories. The caloric estimate of any food is based upon the simple principle that 1 gram of proteids equals 4.1 calories; 1 gram of fat equals 9.3 calories; and 1 gram of sugar equals 4.1 calories; and inasmuch as we know the percentage of these elements in artificial milk, the caloric value of one liter is easily computed and can be said to equal 650 calories. The caloric method recognizes and adopts the value of diluted milk, and also, like the percentage method, increases the carbohydrates of this diluted milk to equal that of mother's milk. The sugar in mother's milk being 7 per cent. in a liter, there will be 70 grams, and to increase the sugars of the diluted artificial milk to contain that amount, it will be necessary to add to the diluent of one-third milk, 8 per cent.; of one-half milk, 10 per cent.; and of two-thirds milk, 12 per cent.; and their respective caloric value will be: One liter of one-third milk, 400 calories; one liter of one-half milk, 500 calories; one liter of two-thirds milk, 600 calories. This may appear rather complex, but if simplified to a system all that is necessary to be remembered is: (1) Age of the child and its weight. The computation of its caloric need is made by multiplying its weight by either 80, 90, or 100 calories,

¹ New York Medical Journal, May 14, 1910.

depending, of course, on its age. (2) To remember that a liter one-third milk with 8 per cent. addition equals 400 calories; one-half milk with 10 per cent. addition equals 500 calories; two-thirds milk with 12 per cent. addition equals 600 calories; and full milk equals 650 calories.

The use of *lactic acid bacilli in infant feeding* has been the subject of several papers. One of the best of these is that of Kendall,¹ of the department of preventive medicine of the Harvard Medical School. He outlines the salient features of lactic acid therapy, describing what the lactic acid bacteria are, the kinds of bacteria employed in intestinal therapy, the conditions under which they may be expected to act in a salutary manner, and the nature of this beneficial action. Lactic acid therapy consists essentially in administering by mouth living cultures of lactic acid bacilli, either in milk soured by their action, or as tabloids, together with some easily fermented carbohydrate. The bacteria ferment the carbohydrate in the alimentary tract, producing lactic acid. The object of this treatment is to restrain the activity of certain proteolytic (putrefactive) bacteria in the intestinal tract. The proteolytic organisms act upon protein and protein decomposition products, forming aromatic substances, indol, skatol, phenol, creasol, aromatic oxyacids, and these aromatic bodies are in turn absorbed and act as slowly cumulative poisons to their host. Such, at least, is the generally accepted hypothesis. According to Metchnikoff, who elaborated this method of treatment, the putrefactive bacteria are largely anaërobic in character and are localized in the large intestine. The lactic acid bacteria, on the other hand, are non-proteolytic in nature and find their most suitable environment in media containing fermentable carbohydrate, which they break down, producing lactic acid in considerable amounts. These organisms do not form putrefactive products, and, indeed, under such conditions they metabolize only enough protein to satisfy their nitrogen requirements. There are many kinds of bacteria which form lactic acid, but in the restricted sense in which the term lactic acid bacilli is used in intestinal therapeutics only those organisms are regarded as true lactic acid bacteria which form lactic acid and smaller amounts of the lower fatty acids, but which do not form putrefactive products from protein, and which do not produce gaseous products from the fermentation of carbohydrate. In addition to the lactic acid bacteria of sour milk, there are normal lactic acid bacilli in the intestines of many of the higher animals. The intestinal lactic acid bacilli are very similar, so far as their nutritive requirements are concerned, to those of sour milk, but there is a rather striking difference between the two classes. The sour milk bacteria usually become localized in the small intestine of men and animals,

¹ Archives of Pediatrics, August, 1910.

while the intestinal lactic acid, particularly *Bacillus acidophilus*, which is the best known, find their most suitable habitat in the large intestines.

After an extended discussion of the nature of the antagonism between the lactic acid bacteria and the putrefactive intestinal bacteria, Kendall summarizes the effect of lactic acid therapy as follows: (1) Objectionable proteolytic activity resulting in the absorption by the host of aromatic substances derived from protein decomposition by the action of proteolytic bacteria may take place in the intestinal tract. (2) These aromatic compounds may be formed in the small or large intestines by the facultative or obligate proteolytic organisms. (3) An excess of protein in the diet of the host, or any factor causing stasis or impaired absorption of protein, appears to be the direct cause of this condition. (4) The addition to the diet of easily fermentable carbohydrates, together with the restriction of the protein, is of material assistance in reducing the output of these putrefactive products in many instances. (5) The beneficial action of the carbohydrate is a twofold one—(a) the character of the metabolism of the facultative organisms tends to change from the putrefactive to the fermentive type, eliminating from the urine the putrefactive products referable to their activity; and (b) the lactic acid bacilli, either those given by mouth or those normally present in the intestinal canal, or both, proliferate rapidly, forming considerable amounts of lactic acid and inhibiting the further development of the obligate proteolytic organisms by rendering the medium in which they are growing unsuitable for continued development. (6) The proteolytic bacteria may be producing their harmful effects either in the small or the large intestine—in the former case the introduction of organisms of the Bulgarian type may be reasonably expected to be of benefit, since we have seen that they tend to localize themselves in the small intestine. If, however, the proteolytic process is of large intestinal origin, the normal lactic acid bacilli of the *acidophilus* type are indicated. If there is reason to suspect that these normal lactic acid bacilli are enfeebled in their action, or absent, it will be necessary to feed fresh cultures by mouth or introduce them by rectum.

Our knowledge of the whole subject of the application of bacteria in intestinal therapy is still far too fragmentary to warrant a discussion of the treatment of these cases. All that can be done legitimately is to analyze and summarize our present knowledge of this subject.

In discussing this paper, Morse¹ draws attention to the influence which the food has in modifying the intestinal bacterial flora. The Bulgarian bacillus and other organisms of the same type act only in the small intestine, and can be expected to do good only when the difficulty is located there. A most important point is that these lactic

¹ Archives of Pediatrics, August, 1910.

acid bacilli may do harm as well as good. Consequently, if we use them in a routine way, giving them freely in nearly every case, as so many do, we may as likely do harm as good. It is impossible to determine, from the clinical signs and symptoms, in what case they are likely to do good and in what case they are likely to do harm. Morse thinks that too much importance is attached to the presence of indican in the urine by many physicians. Some are making diagnoses of serious intestinal lesions and giving most unfavorable prognoses simply on this basis, drawing conclusions which are entirely unwarranted.

Brady,¹ of St. Louis, reports a considerable experience with lactic acid milk and believes that it has a useful place in selected cases. To be successful in its use, the practitioner must be well grounded in the principles of infant feeding. The method does not furnish a short cut to the goal. The good results obtained seem due not alone to the low fat, to the presence of the lactic acid, and to chemical change in the proteids, but also to the presence of the lactic acid bacilli. While the intelligent use of the lactic acid bacilli may result in much good, it should be clearly understood that their routine use may be the cause of much harm. "Buttermilk feeding" is not the simple matter that the commercial admirers of a certain prominent scientist would have us believe.

The so-called *citric acid feeding* is discussed by Langmead,² who reports 80 consecutive cases of wasting infants fed on undiluted citrated milk. Sodium citrate renders the curds in cow's milk more flocculent and soft, thereby overcoming the effect of the ordinary hard, tough curd. Citration has usually been employed with dilution of the milk. But dilution, Langmead asserts, increases the bulk of the mixture and tends to gastric distention. It also reduces the percentage of fat and sugar to proportions below that of human milk, and the process is complicated for the mother. The age at first attendance varied from three weeks to four months. All the cases were much under weight when first seen, and most of them showed gastric and intestinal disturbances. They were all fed on undiluted citrated milk, and close account of their weight was taken from time to time. The amount of milk was graded to the child's age. Two grains of sodium citrate are added to each ounce of the mixture. It is usually dispensed in a watery solution and is added after bringing the milk to a boil. Citration is gradually lessened at about five months and omitted at six months. Its advantages are its simplicity, absence of manipulation, and cheapness. Objections have been made to the amount of proteid in whole milk, but Langmead believes the nature of the curd causes as much trouble as the proteid. Constipation was not noticed more than in

¹ Archives of Pediatrics, June, 1910.

² Proceedings of the Royal Society of Medicine, May, 1910; American Journal of Medical Sciences, August, 1910.

any other method of feeding. The results were a uniform and often marked increase in weight in all cases, with improved or perfect gastric and intestinal efficiency.

In commenting on these conclusions of Langmead,¹ the editor of the *Therapeutic Gazette*, asserts that whole milk treated by citric acid possesses a number of advantages. There are many children in good health who can utilize whole milk, even without the use of the citrate of sodium. The preparation of the milk for the child is an exceedingly simple process, and even the most careless and ignorant can scarcely make a mistake, since all that is necessary is to add citrate of sodium to the milk in the proportion of 2 grains to each ounce. Five grains to the ounce of milk may be used. The citrate of sodium may be dissolved in water so that 2 grains are in each teaspoonful, or, if large bottles are employed, 20 grains of sodium citrate may be dissolved in each dram of water.

The *regulation of fat percentage in infant feeding* is discussed by Blyer,² of St. Louis. As to the influence of fat upon the appetite and the intervals of feeding, he concludes that if it is reduced below 1 per cent. the child becomes hungry even with a reasonable increase of proteids, and that the percentage of fat must determine somewhat the intervals of feeding. As to the influence of fat upon vomiting, he concludes that the rapid precipitation of casein produces vomiting in the presence of fat, that it does not often do so when the fat is removed, and that it is not so much the casein as the fat which is responsible for the vomiting. He further concludes that children on low percentage of fat do not necessarily or commonly suffer from constipation.

The use of *albumin milk* ("eiweissmilch") for the relief of disorders induced and kept up by the fermentation of sugar is advocated by Finkelstein and Meyer.³ In other words, it is a special form of sugar-poor milk food. Its preparation is complex and difficult, and it is not advised by the authors for private practice. It would certainly seem to fill a want often felt in institutional work. The preparation of this food, with directions for use, is given by Leopold,⁴ of New York. Finkelstein's method is considered also by Chapin,⁵ who concludes that when benefits follow its use the results are due more to the form in which the proteids are given, the casein being in a very finely divided state, than to the lessened amount of sugar in the mixture.

The Stools in Infancy. An excellent article on this subject is contributed by Morse.⁶ The breast-fed infant has during the first few

¹ *Therapeutic Gazette*, September, 1910.

² *Archives of Pediatrics*, March, 1910.

³ *Jahrbuch für Kinderheilkunde*, May and June, 1910.

⁴ *Archives of Pediatrics*, August, 1910.

⁵ *Journal of the American Medical Association*, October 22, 1910.

⁶ *New Orleans Medical and Surgical Journal*, August, 1910.

months of life three or four movements daily of the consistency of pea soup, of a peculiar golden-yellow color, with a slightly sour and aromatic odor and a slightly acid reaction. The number of stools diminishes later and the consistency becomes more salve like, the other characteristics remaining the same. The golden-yellow color is due to bilirubin, which passes unchanged through the intestinal tract because of the rapidity of the passage, the relatively low proteid content of the milk, and the low reducing power of the infant's intestine. It is not uncommon, even when babies are doing well on the breast, for them to have a larger number of stools of a diminished consistency and of a brownish color. In such instances examination of the breast milk usually shows that the proteids are high. It is not unusual to find numerous soft, fine curds, and sometimes mucus in the stools of healthy breast-fed infants. While such stools are undoubtedly abnormal, it is unwise to pay too much attention to them if the baby is gaining and seems well.

The breast-fed infant will sometimes go weeks or months without a normal stool and yet thrive perfectly, while if it had such stools when it was taking cow's milk it would not thrive and would show distinct evidences of malnutrition. It is, therefore, unwise to wean a baby simply because the stools are abnormal, if it is doing well in other ways.

Infants that are thriving on cow's milk mixtures have, as a rule, fewer movements than breast-fed babies, and these movements are of firmer consistency. Slight constipation is not uncommon after the first few months, and is not of pathological significance. The color of the stools is a lighter yellow, probably because of the relatively larger amount of proteid, and because some of the bilirubin is converted into hydrobilirubin. When infants receive whole cow's milk or dilutions of cow's milk, so that the proteids are equal to or greater than the fat, the odor is slightly modified toward the fecal, or cheesy because of the action of the bacteria on the casein. The reaction becomes alkaline for the same reason.

When infants are fed on mixtures very low in fat and high in proteids, the stools have a slightly brownish-yellow color, a slightly cheesy or foul odor, and a strongly alkaline reaction because of the longer stay of the casein in the intestine and the consequently greater opportunity for the bacterial action and for the change of bilirubin to hydrobilirubin. When infants are fed on whey or whey mixtures, low in fat, the stools have essentially the same characteristics as those from skim milk, except that they are usually browner. Whey has a laxative action in many instances and sometimes has to be omitted for this reason. When starch is added to cow's milk mixtures the color of the stools becomes more distinctly brownish and the reaction tends toward the acid. The odor is more aromatic. The character of the starch has but little effect on the number of movements, in spite of the common belief that

barley starch is constipating and oatmeal starch laxative. Most starch flours contain small brownish specks which are the remains of the husks. These specks pass through the gastro-intestinal tract unaffected and appear in the stools.

The addition of malt sugar to cow's milk mixtures changes the color of the stools to a dark brown, tends to make the reaction acid and to increase the acidity of the odor. The stools of infants fed on butter-milk and buttermilk mixtures are of a peculiar shiny, salve-like appearance, grayish brown in color, alkaline in reaction, and have a very characteristic acrid odor. When beef juice or broth are added to the infant's diet the color is changed to brown, while the odor becomes fecal and the reaction alkaline from the action of bacteria on the proteids.

The reaction of the normal stool depends upon the relation of the fats and proteids in the food. When there is an excess of fat, the reaction is acid; when there is a relative excess of proteid, the reaction is alkaline, the reaction depending, in the one case, on the products of the decomposition of fat; in the other, on the products of the decomposition of the proteids. The carbohydrates have no effect on the reaction of the normal stool. Stools which irritate the buttocks invariably are acid in reaction, and in most instances the acidity is due to the decomposition of carbohydrates. Frothy stools are usually acid in reaction, and are due to the same cause, but sometimes the frothiness is caused by gases generated in the decomposition of proteids. The reaction of the stools is, however, of little importance from the clinical side. It is best tested by placing wet red or blue litmus on, not in, the stool.

Abnormalities in the color are very common. The color of the stool must not be judged from the outside, as it may change very rapidly from drying and exposure to the air. The most common abnormal color is green. In a general way, the darker the green the greater the significance. A very light grass-green color in a stool of otherwise normal appearance is of no practical importance. The change from yellow to green after the stool is passed is not abnormal. The green color is, in the vast majority of instances, due to the change of bilirubin to biliverdin. The green color is not characteristic of any type of disease. The next most common abnormal color is gray. This is due, as a rule, to the absence of bile and the presence of some form of fat in the stool. However, there may be bile in the stool, even when it is gray, the bile pigment being in the form of the colorless leuko-hydrobilirubin. It is never safe, therefore, to conclude that there is no bile in the stool without a chemical examination.

White stools are due to the presence of undigested fats in the form of soaps. These may be soft, look much like curdled milk, or, more often, hard and dry, resembling the stools of a dog which has been eating bones. The black stool, while in rare instances due to the presence

of changed blood, is usually due to the action of some drug, usually bismuth but sometimes iron. When there is no sulphuretted hydrogen in the intestine, bismuth may pass through the intestine without changing color. The administration of a grain or two of sulphur in the twenty-four hours will turn the stools black. Whether or not this is of any advantage is questionable. The stools are sometimes of a slaty-blue color. This color is due to some change in the bile pigments, and is of no more significance than the green. It is very common to see a pink stain on the diapers about a stool which is otherwise normal or nearly so. This pink stain is of no special significance, and is probably due to some change in the bile pigment.

The most common abnormal constituents are *curds*. Judging from the literature, there is very great confusion as to the composition and significance of curds in the infant's stools. The matter is, however, a simple one. There are two kinds of curds, one composed of casein primarily, the other composed mainly of fat, mostly in the form of fatty acids and soaps. The small amount of fat in the casein curds and the small amount of proteid in the fat curds are merely incidents. The casein curds vary in size from that of a bean to that of a pecan nut. They are usually white, sometimes yellow, in color. They are firm and tough, cannot be broken up by pressure, and sink in water. When placed in formalin they become as hard as rocks; they are insoluble in ether. The fat curds are small, varying in size from that of a pinhead to that of a pea. They vary in color from white to yellow or green, according to the general color of the movement. They are easily broken up by pressure, and when shaken up in water tend to remain in suspension. They are soluble in ether to a considerable extent after acidification and are unaffected by formalin.

Mucus can be detected in small amounts under the microscope in the majority of normal stools, and is almost invariably present in abnormal stools. It is never present macroscopically in normal stools, but is very common in the abnormal. It does not denote any form of disease, but merely an excessive secretion of the mucous glands from some cause. When thoroughly mixed throughout the stool, it usually comes from the small intestine; when in combination with a clay-colored stool, from the duodenum; when on the outside of a constipated stool, from the rectum. Stools composed mainly or entirely of mucus and blood indicate either severe inflammation of the colon, or intussusception. Undigested starch is often mistaken for mucus. It can be distinguished by the addition of iodine, which stains the starch blue, but does not change the mucus.

Blood on the outside of a constipated stool indicates a crack of the anus. Blood mixed with mucus indicates either severe inflammation of the large intestine or intussusception. Blood in infancy is seldom due to hemorrhoids. *Pus* indicates severe inflammation of the

large intestine. It is usually not present early in the disease, but appears later. *Membrane* indicates very severe inflammation of the large intestine, and is rarely seen, the patients usually dying before membrane appears in the stools. *Undigested fat* may show itself in the form of small soft curds, by giving a greasy, shiny appearance to the stools, or by giving a gray or white color. The presence of undigested fat may be shown roughly by rubbing some of the stool on a piece of smooth soft paper. If there is an excess of fat the paper will have, when dry, the appearance of oiled paper. When there is an excess of neutral fat the stools are often of a creamy consistency. If the fat is largely in the form of soaps, the stools are usually clay-like, or very dry and crumbly. The reaction is highly acid; the odor rancid, like that of butyric acid.

The presence of large tough curds in the stools is evidence of proteid, or rather, casein indigestion. In general, however, the stools of proteid indigestion are loose, brownish in color, alkaline in reaction, and with a foul odor, the odor in some instances being fecal, in others cheesy, in others a combination of the two. The stools of proteid indigestion are more likely to show an excess of mucus both macroscopically and microscopically, than those of either pure fat or carbohydrate indigestion. Mixed types of stools, as the products of indigestion modified by bacterial fermentation and decomposition, are far more common than the pure types alone, and are often very difficult to interpret.

The stools of the newborn infant are described by Southworth,¹ who made careful observations upon fifty infants successfully breast fed. These observations seem to warrant the conclusion that the classical orange-yellow, semisolid stools appear in the majority of newly born infants later than is usually stated. Considerable variation in the color and consistency of the stools is entirely compatible with regular gains in weight. Such variations in the stools for ten days or more, even with slow, halting, or irregular gains in weight give no indication that successful breast feeding cannot be carried on. Whatever the character of the stools, weaning is never indicated if the infant is gaining steadily in weight; nor with delayed gains until intelligent efforts have been made to bring mother and infant into physiological accord.

In the dark-green mucoid stools of insufficient nutrition, which are starvation stools, and are not limited in their occurrence to the first few days of life, there is a practical absence of milk residue. A good yellow color of the masses of milk residue, or a yellow color when they are smoothed out, precludes the assumption of indigestion, whatever the color of the exterior or of the surrounding medium. Delayed gains in weight are very often the result of factors which prevent the

¹ Archives of Pediatrics, March, 1910.

infant from securing a sufficient quantity of milk from perfectly competent breasts, and with patience and ingenuity these difficulties may be overcome.

THE SIGNIFICANCE OF CURDS IN INFANT STOOLS. This subject is considered by Talbot¹ in an interesting paper. The two kinds of curds are described as follows: The large curds are solid and tough, usually round or oval; they cannot be smoothed out on a napkin and retain their identity even when moderate pressure is exerted upon them. If they break, the individual parts retain their contour. When these tough curds are put in water and shaken up, they quickly sink to the bottom of the vessel, and can thus be easily separated from the rest of the fecal mass. They are composed of casein, which on coagulating, entangles the milk fat in its meshes; thus, the amount of fat in the curds depends upon the amount of fat in the milk. The assumption that the curds resulting from the gastric digestion may pass through the intestine practically unchanged, and that they are digested only on the surface, is confirmed by chemical analysis. Most of the fat in the curd is unchanged neutral fat, while only a very small amount is split into fatty acids and soaps; in other words, the larger part of the fat is in the same form as the fat in the milk and very little shows the result of the action of the digestive juices upon it. These curds always contain a very high percentage of nitrogen, which represents casein.

The small soft curds appear in the stools as either soft white flakes or pinhead elevations; they are always associated with more or less mucus, which is stained green or yellow. These curds are soft, can easily be smoothed out, and tend to be held in suspension when shaken up in water. They are composed mainly of fat, most of which is in the form of fatty acids and soaps, and contain a very low percentage of proteid. This means that the fat is normally digested but not completely assimilated, and that the proteid is completely digested. The small amount of nitrogen represents the bodies of bacteria, intestinal secretions, and cast-off epithelial cells. If, after these tests have been applied, there is still doubt whether the curd is due to fat or casein, it may be placed in 10 per cent. formalin and allowed to stand from four to six hours. The casein curd will be very hard and the fat curd soft at the end of this time. This action of formalin, of hardening casein, is a principle which has been employed many years in the manufacture of billiard balls.

Certain general principles based upon our knowledge of the origin of the two kinds of curds may be formulated: If a baby shows signs of indigestion, does not gain in weight, and is passing stools which contain curds, casein is at fault and should be replaced by some other food. If another baby shows signs of indigestion, stops gaining weight,

¹ Boston Medical and Surgical Journal, February 3, 1910.

passes stools containing many soft curds, fat is at fault and should be diminished. Whenever either of these food components is diminished, the other should be increased so that the caloric needs of the infant may be supplied. These general principles unfortunately do not apply to all babies, because sometimes an excess of one food component will so change the digestion that another component will appear in the stools.

Tough curds may appear in the stools of infants who are gaining and showing no other symptoms of indigestion. In such instances it is not necessary to diminish the amount of casein in the food. They indicate, however, that it would not be wise to increase the amount of casein, because the physiological limit has been reached. If more casein is given, despite the warning, symptoms of indigestion usually appear. Tough curds are never seen in the stools of breast-fed babies. Symptoms of indigestion, failure to gain in weight, and several stools daily containing soft curds indicate an indigestion of fat. In these cases the percentage of fat should be lowered, always supplying the calories taken away by other food components. When this is done the baby usually begins to gain.

Many normal breast-fed babies pass fat curds in their stools off and on during their whole nursing period and still continue to gain. Even if these babies have a little colic, the curds should be neglected. Soft curds in the stools of breast-fed babies that are doing well are of no significance. If a baby fed on the bottle passes fat curds and continues to do well, do not reduce the percentage of fat in the formula. The significance of these curds should be remembered, and they should be acted upon as soon as any symptoms of indigestion appear. Curiously enough, certain babies passing fat curds are able to digest more fat without passing more curds and without having more symptoms of indigestion. However, when these soft curds are accompanied by colic, regurgitation, and no gain in weight, they show that they are being given too much fat in their food.

Colloid Chemical Aspect of Digestion. Some remarkable observations which promise to make clear some heretofore obscure facts in digestion are reported by Mr. Jerome Alexander.¹ Another paper written by the same author in collaboration with Dr. J. G. M. Bullowa² upon the protective action of the colloids in milk, with ultramicroscopic observations, throws light of a most important nature upon some obscure questions in infant feeding. It is impossible in the present space to make clear the details of these observations. The authors conclude: (1) The casein of milk is an irreversible, or coagulating, or unstable colloid, which is protected by lactalbumin, a reversible or stable colloid.

¹ Journal of the American Chemical Society, May, 1910.

² Archives of Pediatrics, January, 1910.

(2) In the modification of cow's milk for infant feeding, it is necessary not only to consider the percentage of "total proteids," fat, etc., present, but to see that the casein is adequately protected. This is not a re-statement of the principle expressed in the doctrine of "split proteids." The casein exists in cow's milk in an already formed higher degree of colloid aggregation. (3) Bald chemical analysis, without taking into account the principle of colloid protection, is an insufficient criterion for the actual digestibility or availability of food.

In a second paper these authors¹ conclude that increasing the colloid protection of the casein in cow's milk by the addition of protective colloids tends to improve the digestibility and absorption of both the casein and fat, and to prevent the formation of indigestible curds.

Rachitis. The etiology of rickets, as well as its pathology, is still far from settled, if we are to judge by the diversity of opinion among physicians and the theories that are propounded. Hutinel² believes the essential characteristics of rickets to be a quantitative change in the bone marrow. The qualitative changes, he asserts, are not characteristic, but expansive proliferation of bone tissue is peculiar to this disease. The body tissues show a tendency to dystrophy, as do also numerous other tissues. Czerny³ believes rickets to be a constitutional malady of congenital type. While the chief symptoms are shown in the bones, other organs are also involved, particularly the nervous system. Deficiency of lime in the food he regards as an important factor in the etiology. Schabad⁴ reports observations upon the relative amounts of lime eliminated by the kidneys and by the bowels in healthy and rachitic children. In progressive cases he asserts that the lime is eliminated exclusively by the bowel, which, he believes, disproves the acid theory. The same author⁵ commends the time-honored remedy of phosphorus and cod-liver oil. He asserts that it has an undoubted effect in favoring the retention of lime in the body.

Vanderslice⁶ asserts that rickets is a dystrophy, therefore a constitution disorder. It is commonly defined as a condition of malnutrition affecting all structures of the body, but chiefly the bones. It is this last phase which has caused misunderstanding and confusion, for the bones are but one of the many structures involved. The author holds that rickets is a diet disease. Children rarely die of it *per se*. It is usually some intercurrent disorder that terminates life. Of these the pulmonopathies find in the rachitic child most favorable conditions, and, if survived, leave the patient with permanently damaged chest

¹ Journal of the American Medical Association, October 1, 1910.

² Archives de Médecine des Enfants, February, 1910.

³ Monatsschrift für Kinderheilkunde, 1910, ix, No. 3.

⁴ Archiv für Kinderheilkunde, 1910, liii, Nos. 4 to 6.

⁵ Jahrbuch für Kinderheilkunde, 1910, lxx, No. 1.

⁶ Journal of the American Medical Association, October 15, 1910.

and respiratory organs, which may eventually terminate in an invasion of tuberculosis. Patients with marked splenic enlargement and profound anemia may become marantic with a grave prognosis. Convulsions cause death in a large number of these cases. Laryngismus stridulus appears to be a causative factor in many fatal cases, but it is impossible to say to what extent the rickets may be held responsible. The active rachitic process usually ceases by the end of the second year, the length of the disorder depending on the ability to remove the indigestion and give an appropriate diet. In many cases, rickets appears to develop with the advent of an improvement in diet and a clearing up of the digestive disturbance. This may be explained by the fact that at the beginning of the treatment of the digestive system the patient was in a condition of athrepsia, and with the better hygiene the dystrophy took on a lower grade of malnutrition, namely, rickets. This form of the disorder is usually transient, lasting but a few weeks.

The lack of fat in the food has long been emphasized as a causative factor of rickets, but the author gives a warning against putting too much stress on this phase and thus undoing good effects by the giving of more fat than the child can utilize. Good hygiene with plenty of fresh air is a prerequisite. No diet can be set down that can be regarded as curative. As a general rule, cow's milk should be given, but as these cases occur especially in children fed on starchy foods, it must be remembered that the stomach will need much education in digestion and the initial use of milk must be in very attenuated doses. Expressed beef juice, raw eggs, orange and lemon juice, all have a place in the dietary.

RHINOLOGY AND LARYNGOLOGY

By D. BRADEN KYLE, M.D.

THE NOSE

Congenital Deformity of the Nose. A case of rare nasal deformity is reported by Wilkinson,¹ which consisted of a deep depression in the middle line of the nose, with wide separation of the nostrils, and flattening and broadening of the whole feature. The nose was 3 cm. wide at the level of the alæ, but only projected about 1 cm., the greatest projection being on either side of the middle line in front of each nostril. These two prominences were separated by a depression of the tip of the nose 2 cm. wide. The nasal bones and nasal processes of the superior maxilla were flattened. There was no separation between the nasal bones. The columella was 2 cm. broad, and the anterior nasal spine could be felt behind the columella as a broad projection of bone, about 1½ cm. from side to side. Upon inspection of the nasal passages, the anterior ends of the nasal septum could be seen as a prominent ridge on the inner sides of each vestibule. The two sides of the septum were apparently separated from each other. There was no nasal obstruction. Upon everting the upper lip, there was seen a distinct notch on the buccal surface in the very centre of the lip. There was also a well-marked notch in the middle line of the alveolar process. The two halves of the alveolus were not in alignment, but met with a forward-pointing angle. Two uncut incisors could be felt beneath the gum on either side of the mesial notch, showing that this represented a division between the two halves of the premaxillary bone. The deformity arose, no doubt, from failure of fusion of the two mesial masses of the frontonasal process.

Plugging the Nostrils to Prevent Contagion by Inhalation. Plugging the nostrils with cotton as a protection against the diseases contagious by inhalation is advocated by Henry Albert,² of Iowa City. He says there is little doubt that the causative agents of most infectious diseases, and especially those that are highly contagious, enter the system by being inhaled, and invade the tissues primarily through the mucous membrane of the nose or other portions of the respiratory tract. Recent investigations have also shown that a person who has never had a certain

¹ British Journal of Children's Diseases, August, 1910.

² Journal of the American Medical Association, May 28, 1910.

disease may be a "carrier" of the germs of that disease otherwise than by the long recognized modes of carrying bacteria about the hands, clothing, etc. A person exposed to diphtheria may have his nasal cavity or throat infested with diphtheria bacilli even though not affected by the disease, and such person may transmit the germs to another in whom the disease may develop. There would seem little reason why physicians, and those nursing patients who have diseases which are contagious by inhalation, should not protect themselves and others by placing a piece of cotton in their nostrils while in attendance on such patients.

Effect of Tobacco on the Nose and Throat. From such facts as Reik¹ has been able to collect, it does not appear, at least it has not been proved, that tobacco causes any definite characteristic lesions of the nose and throat. While it is possible that the excessive use of tobacco may, by indirect action, produce a toxic effect on the olfactory nerve, with resulting impairment of the sense of smell, there is not at the present time any definite laboratory proof for such an opinion, nor is there sufficient clinical evidence to substantiate the belief. The ill effects of tobacco smoke upon existing diseases of the throat, arising from other causes, is established, and is the same as would be observed from any other form of irritation. That gastric and systemic disturbances may arise from excessive use of tobacco, in any of its forms, is unquestioned; the nicotine content of tobacco is a recognized poisonous substance and, in the process of smoking, there are evolved other injurious chemical products. Carbon monoxide is probably a more dangerous and injurious constituent of tobacco smoke than is nicotine, only a very fractional amount of which ever enters the tissues. If there is any more danger to be anticipated from cigarette than from cigar smoking it is to be looked for solely in the inhalation of the smoke; cigarette smoking without inhaling is no more injurious than is pipe or cigar smoking, probably not so much so, unless enormous numbers be smoked.

Fracture of Nose. A device described and figured by Martin² for the correction of deformities of the nose, and especially to aid in the healing of fractures of the nose, consists of a small frame which fits into each nostril, with an adjustable arm that can be raised and held immovable by means of a screw in the lower part, turned by a watch-key. The two parts are connected by a gold wire, which is all that shows as it crosses the septum in front. In cases in which external support is required, he uses a small frame which fits on the face just around the nose, with a little hook in front to hold the gold wire, and a spring passing over the head to hold it in place. The results obtained in a number of cases are described to demonstrate the advantages of

¹ Boston Medical and Surgical Journal, June 23, 1910.

² Lyon Chirurgical, January, 1910.

his technique, which, it is asserted, does not discommode the patient. The principle includes operative correction, chiselling away bone if necessary to restore the normal shape, and then immobilization by means of this apparatus until complete consolidation takes place. The pressure induced by the adjustable arm is graduated to secure the maximum effect without discomfort.

Epistaxis in Cerebrospinal Meningitis. During the epidemic which came under the observation of Rimbaud¹ during the past winter at the penitentiary colony at Aniane (Herauld) there was epistaxis in 4 out of 12 cases. In the 3 first cases, the attacks of epistaxis determined an immediate improvement in the symptoms. In the first case, the bleeding took place on the second day and was followed by a sharp fall of temperature, and on its repetition in the evening the fever fell, the delirium ceased, and recovery was complete in a week. In the second case, the epistaxis did not occur until the fifth day, and recurred three times in the twenty-four hours. Here, again, there was marked and immediate improvement, with rapid subsidence of symptoms of meningitis. Much the same thing occurred in the third case, the disease only lasting six days. In the fourth case, the effects were not so marked, and recovery was delayed three months. Here then are 4 cases of cerebrospinal meningitis with epistaxis, in all of which the patients recovered. In this particular epidemic the mortality was comparatively low, 25 per cent. In only 1 case was antimeningococcus serum employed, so that it looks as if the low mortality were due to epistaxis. The cases may be classified as follows: Meningitis without epistaxis, 8, with three deaths, 37.5 per cent.; meningitis with epistaxis, 3, with no deaths.

Treatment of Epistaxis. Boyd² describes a simple method of controlling nasal bleeding, as follows: 'Take a piece of fine starched muslin from 5 to 6 inches square; impinge the points of a closed dressing forceps, a thin pen holder will do, in the centre, and pull the muslin over the forceps, forming a closed umbrella appearance with the forceps as the handle. This is passed through the nostril until it comes in contact with the posterior nasopharyngeal wall, when the forceps is withdrawn. The ends of the muslin are now spread over the face and held in place by the fingers of the left hand, and the hollow cone is rapidly plugged from behind forward with small pieces of cotton wool soaked in any available styptic, *i. e.*, vinegar, as firmly as is thought desirable; the projecting ends of the muslin are trimmed off, and the little operation is completed easily in a couple of minutes. The second nostril is similarly dealt with, if necessary. If it is not necessary to plug the postnasal fossa, the muslin cone, after withdrawal of the forceps,

¹ Medical Press and Circular, September 7, 1910.

² Australasian Medical Gazette, January, 1910.

can be pulled forward to clear the posterior wall of any pressure before the plugs are introduced. The muslin should not be moistened, and the little plugs should be rapidly introduced before the cone becomes flabby with moisture, as they slip in so much more easily.

Bacteriology of Rhinitis. An extensive study of the bacterial flora of the nasal mucosa in the presence of rhinitis was made by Walter,¹ of Chicago, for the purpose of ascertaining, (1) whether the flora in our territory are comparable to regions where such investigations have been made, namely, in various parts of England and Germany, and (2) to uncover, if possible, the etiological factors in infections of the mucosa of this tract. From this research he draws the following conclusions:

"The evidence seems indicative that the diphtheroids, particularly *Bacillus segmentosus* of Cautley, are concerned in the production of so-called common cold in its typical manifestation in the nose, and there is much evidence that it occurs in epidemic form. The *Micrococcus catarrhalis* is much more general in its manifestation, and is probably also epidemic and productive of a rather more severe inflammation, though mild epidemics occur. It seems likely that the symbiosis of these two organisms increases the virulence. The pneumobacillus of Friedländer is much more concerned in chronic conditions and is probably identical with the *ozena bacillus*. The pneumococcus of Fränkel flourishes in any part of the upper respiratory tract and, when virulent, has been found in pure culture."

"Clinically, the segmentosus infection is most likely to be in the nose, seldom in the trachea, but may cause otitis media; *Micrococcus catarrhalis* is most apt of all to invade the larynx and trachea, but may occur in the ear or nose, and with variable virulence. The pneumobacillus is mostly confined to the nose and sinuses. Influenza is conspicuous by its absence. Pyogenic cocci are non-pathogenic locally, except as secondary invaders, and the probability is that only a limited number of strains are concerned in causation of acute infections on the mucosa, and these are not genuine coryza. The bacterial flora in America probably does not differ materially from that of other countries, but must of necessity be governed largely by environment, occupation, social position, and epidemics as to the ratios of finding."

"Catching Cold." Laying aside unfounded traditions and depending solely upon our present knowledge, Brady² says that it may be confidently affirmed that the vulgarly listed causes of respiratory diseases, such as cold, dampness, exposure, wet feet, and draughts, are, for all practical purposes, entirely negligible factors, and the only precaution necessary against them is the effort to secure bodily comfort which

¹ Journal of the American Medical Association, September 24, 1910.

² Medical Record, September 19, 1910.

is purely instinctive, though very commonly misguided. Cold has no demonstrable etiological relation with respiratory disease. Clean draughts are not only harmless, but salutary, being requisite for perfect ventilation. The phrase "catching cold" is meaningless, misleading, undignified, and obsolete. The groundless fear of cold, fostered by the abuse of this misleading phrase, constitutes, he declares, a form of hysteria that opposes and embarrasses earnest therapeutic measures. So far as we know the true predisposing factors of the various respiratory diseases, both acute and chronic, are dietetic sins, unhygienic clothing, overheated apartments, and defective ventilation. Prophylaxis, therefore, consists in directing intelligently man's instinctive effort to secure bodily comfort, together with reasonable isolation of every case of respiratory disease.

Treatment of Atrophic Rhinitis. In discussing the treatment of atrophic rhinitis, Porcher¹ expresses the opinion that the atrophic process is more a result, rather than a cause, of the crust formation, and that the process has its origin primarily in the accessory sinuses. He calls attention to the fact that whenever inflammatory secretions from any portion of the lower respiratory tract come in contact with the external air, they become coagulated or gummy and finally harden, generally with a more or less fetid odor, and believes that practically the same thing occurs with the crust formation in the nose. In the treatment of these cases, Porcher recommends large doses of potassium iodide, together with such operative measures necessary to promote free drainage from the accessory sinuses. The well-known influence of potassium iodide in producing lacrymation and increasing the nasal secretion suggested that drug as the most efficient with which to maintain the fluidity of the secretions, and thereby enable the patient to expel the accumulations and prevent the offensive odor. It was found necessary to give it in increasing doses until a very large amount was ingested daily before the desirable result was accomplished. Many patients were found who would absorb from 600 to 900 grains a day before the nasal secretions would remain fluid, and this without any noticeable ill effects; on the contrary, the gain in flesh would be rapid and the improvement in the general health very marked. In gradually increasing doses, up to the large amounts advised, there were but few of the well-known constitutional effects of the drug exhibited; no salivation, but little lacrymation, no apparent ill effects on the kidneys, and few or no symptoms of iodism on the skin. In none of the cases reported was there a history or symptoms of syphilis. Patients with constitutional syphilis who will not tolerate potassium iodide, in any amount, are familiar to all, hence the presence or absence of syphilis does not appear to influence the tolerance for the drug in any way, so that the

¹ Journal of the American Medical Association, August 13, 1910.

extreme toleration for it in the large doses mentioned did not lead Porcher to assign syphilis as the underlying cause. It is a noticeable fact, however, that those who have the crusts in the nose are almost universally extremely tolerant of the drug. Just what the underlying condition or diathesis in the blood is, he is not prepared to say. It seems to be recognized by many authorities to be syphilitic in many instances, but it is certainly not so in a great number of cases, as mercury seems to have no influence on them whatever, even when pushed to the verge of salivation. Porcher states that in every case in which he has used these large doses of potassium iodide, together with the operative treatment, the crusts have ceased to form.

Improved Technique for Paraffin Injections. Leroux¹ combines the advantages and avoids the perils of the hot and cold methods of injecting paraffin, in the treatment of ozena, by injecting the paraffin cold, and several days later he applies a jet of superheated air to the spot, under the influence of which the paraffin softens as if it had just been injected hot, penetrates into the crevices and spreads out in a more even layer. At the same time, the hyperemia thus induced stimulates the secretions and aids in the cure of the ozena. He asserts that the injection of paraffin under the nasal mucosa is the only means of actual cure of this disease, all other measures having merely a palliative effect. He uses paraffin with a melting point at 45 C. and injects it in the inferior turbinate and upper part of the septum, aiming to retain, so far as possible, the natural shape and size of the passages, and facilitate the flow of air through them. It is important, he says, to commence at the remotest part and to allow time for the lesion to heal before making another injection.

Chronic Nasal Diphtheria. Dunbar Roy² believes that chronic nasal diphtheria is much more prevalent than is supposed, and mentions five cases coming under his observation. They occurred in children, aged from five to ten years, and presented the same characteristic features. There are practically no constitutional manifestations, and but for the local symptoms the patients rarely experience any discomfort. One of the first symptoms noted is persistent nose bleed, and this is probably the first sign to which the parents' attention is called. In addition to the epistaxis the child presents symptoms of a bad cold in the head, some mild purulent discharge from the nose, and possibly enlargement of the submaxillary glands. Rhinoscopic examination reveals a distinct membranous deposit on one or both sides, which, with the attendant swelling, almost completely blocks the nasal passage. At the mucocutaneous junction, crusts and abrasions will be present as a result of the irritative nasal discharge. Attempts to dislodge this membrane frequently cause very severe hemorrhage.

¹ Presse Médicale, May 7, 1910.

² Journal of the American Medical Association, August 6, 1910.

Roy says that many rhinologists no doubt¹ often have looked into the nasal cavities and have found adhesions between some portions of the turbinates and septum and have asked immediately whether there has not been an operation previously on that side. Many such cases no doubt are due to operations in the nose, especially ill-advised and ill-executed galvanocautery applications, but some of them are due also to this condition of chronic diphtheria or membranous rhinitis, for in one of his cases, in spite of the very best attention, an adhesion did form between the lower turbinate and septum on one side, which later had to be cut. We must recognize the multiform manifestations of diphtheria wherever there is a mucous membrane, and whenever a child continues to have a cold in the head with excoriations at the mucocutaneous surface and occasional nose bleed, we must look on this condition with suspicion.

Diagnosis of Syphilitic Lesions of Upper Air Passages. Zange¹ regards the Wassermann reaction as a powerful aid in the differentiation of suspicious lesions of the upper air passages; negative Wassermann findings should impose caution. The lesions themselves are not characteristic, only their mode of development and history. Spirochetes are comparatively rare in tertiary lesions, but inoculation of animals with scraps of suspicious tissue will at least exclude tuberculosis. He reports 11 cases in which the Wassermann reaction gave the clue, and led to effectual treatment. In a case with negative Wassermann reaction, the findings seemed to be characteristic for gumma or a primary sore on the tonsil, but the lesion subsided spontaneously in the course of a few weeks; the retrospective diagnosis was Vincent's angina, and mercurial treatment would have been an error. In another case, the bones of the nose were being eaten away, and everything except the negative Wassermann reaction indicated syphilis, but an operation revealed a chronic osteomyelitic process and a prompt cure followed its evacuation. A mercurial injection for diagnostic purposes has little differential value in the tertiary phase of syphilis, as, in many cases, the system in this stage seems to be refractory to mercury and iodides.

Bleeding Polypus of Turbinate. While this form of tumor is comparatively frequent on the nasal septum, it rarely takes origin from the turbinates. Hastings² reports the case of a man, aged forty-two years, who complained of epistaxis of one month's duration. Every time he blew his nose he was troubled by bleeding from the right nostril, which lasted about a quarter of an hour. When the nose was examined, a pedunculated growth of about the size of a pea was seen growing from the lower border of the right inferior turbinate not far from its anterior extremity. The tumor was purple in color and smooth on the surface, and blood-clot was adhering to it. Upon section, it was seen to be a

¹ Medizinische Klinik, July 17, 1910.

² Lancet, March 19, 1910.

soft angiofibroma, in the delicate fibrous matrix of which were embedded the characteristic oval endothelioid cells. It was bordered by squamous epithelium, and, at one point where ulceration had taken place, there was an infiltration with polymorphonuclear leukocytes; no mucous glands were present in the tumor, though abundant in the adjoining mucous membrane of the turbinate. Scattered through the growth were many spaces lined with endothelium, but, unlike the mucous sinuses, devoid of an investment of unstriated muscular fiber; some contained blood cells, others were empty and probably lymphatics. Fibroangiomatous meshwork was well seen. The histological structure falls closely into line with the loose-textured fibroma type of the small angiomatous tumors, the so-called "bleeding polypus of the septum."

Malignant Disease of the Nose. Stuart-Low¹ deprecates the fact that, in nearly all the writings of the authorities, the subject of malignant disease of the nasal passages is so unsatisfactorily and scantily dealt with, and that many statements are very contradictory and unreliable. He reports a number of cases which illustrate and emphasize the importance of clearly comprehending the urgent necessity for early diagnosis if the patient's life is to be saved. His conclusions are: (1) Pain is not to be relied upon as an indication of malignant disease in the nose. (2) Increasing and persistent stuffiness, especially if unilateral, is an important point as regards diagnosis. (3) Recurring and increasingly severe hemorrhage, especially if unilateral, is always a suspicious symptom. (4) A combination of hemorrhage and increasing stuffiness is often a serious indication of newgrowth existing. (5) The making of an early diagnosis is of great importance. (6) It is imperative to make a thorough and systematic examination in all obscure cases of nasal disease, and to remove early a piece of any obstruction in the nasal passages for a pathological report. (7) It is of great importance, when there is malignant disease, to operate as soon as possible after a diagnosis has been made in order to secure a successful removal. (8) It is advisable to adopt the canine fossa route in operating for the extirpation of intranasal tumors. (9) Innocent and malignant polypi are likely to co-exist.

Polypoid Sarcoma of the Nose. Under this term, F. C. Madden² describes a tumor whose structure is that of sarcoma, but of such a low grade of malignancy as to produce comparatively little destruction of surrounding parts, after a long period of growth. Clinically, the sequence of symptoms appears to be polypus formation in both nostrils, leading soon to complete nasal obstruction; expansion of the cartilaginous portion of the nose, with marked hypertrophy of the overlying skin; and later, marked thickening and infiltration of the columella

¹ Lancet, October 1, 1910.

² Practitioner, London, March, 1910.

and upper lip, with finally, but only after a very chronic course, extension to the surrounding parts.

Reflex Nasal Neuroses. Killian¹ calls attention to the increased frequency of reflex nasal neuroses in city dwellers, and suggests a revision of the entire subject, as treatment is successful only when applied strictly according to indications in the individual case. These indications are determined by the sensitiveness of the nasal mucosa, and this he tests by the reaction to the contact of a piece of fine thread held in a slit cut in the end of a fine sound, so that the thread projects about 7 mm. from the tip of the sound. Drawing this thread along the forehead, cheek, outside or inside of the nose for about 3 mm. causes a tickling sensation. With normal sensibility tickling does not induce any reflex action, but, with an ultrasensitive mucosa, the tickling is followed by sneezing, lacrymation, etc. Certain points in the nose are more sensitive than others, especially the processes on the septum and points in front just above the anterior end of the inferior turbinated bones. The reflex action occurs more easily as the mucosa becomes more sensitive under the prolonged influence of irritating dust, etc. By the thread test it is possible to localize the areas of ultrasensitive mucosa, and put an end to the neurosis emanating therefrom by cauterizing the nerve terminals, or slicing off the mucosa. It is important to determine the special nerve involved in the morbid area. Yonge has been successful in curing the anterior type of nasal neurosis by resecting the internal branch of the nasal nerve by way of the orbit, and Neumeier, Bloss, and Killian himself have also performed successful operations of this kind. Zuckerkandl advocated this technique in the treatment of neuralgia of this division of the fifth nerve. Killian has accomplished the same result by an intranasal operation, dividing the branch innervating the septum with a small right-angled lancet, and the side branches above the anterior end of the inferior turbinated bone. The branch of the sphenopalatine in the septum can be severed with scissors above the upper margin of the posterior nares. The branches of the palatine nerve passing upward to the inferior turbinated bone can also be severed in the same way, but it is simpler and easier here to remove the mucosa. Pure olfactory nerve neuroses cannot be so readily treated, as direct cauterization is out of the question. The first division of the fifth nerve sends branches to the lacrymal gland, the side of the eyelid and the conjunctiva, to the skin of the forehead and to the nose, and all these regions participate in the reflex reaction to a tickling irritation in the ultrasensitive areas in the nasal mucosa. Tickling, local hyperemia, and increased secretion occur not only in the nose, but in the eye and possibly in the frontal sinus, and there may be photophobia and frontal headache. The heart action may even be influenced. Sneezing

¹ Deutsche med. Wochenschr., October 6, 1910.

is the most characteristic manifestation of this form of nasal neurosis, while swelling of the turbinates and hypersecretion are more pronounced with the sphenopalatine neurosis. The latter may induce certain forms of neuralgia, headache, and vasomotor pseudo-erysipelatous redness, and swelling of the cheek, the latter being due to radiation into the infra-orbital domain. The sphenopalatine neuroses may also involve the respiration and heart action. Killian explains the mechanism in detail, calling attention to the special connection with attacks of coughing and asthma, in particular to the nasal form of asthma which may develop without much sneezing, rhinitis, or hay fever. Rosenberg found that irritation of a point far back on the septum always brought on a severe attack of coughing in one asthmatic patient, and cauterization of this point cured the asthma. Hartmann also reported a similar case, only that the ultrasensitive point in his case was at the posterior end of the inferior turbinated bone. Irritation of a point backward and high up on the septum slowed the heart beat and made it irregular in Koblanck's experiments on dogs, and clinical experience is confirming the existence of this special "heart point." The thread test enables the ultrasensitive areas of the nasal mucosa to be readily localized and points the way to effectual treatment of the special nerve responsible for the local regional and remote reflex phenomena which, untreated, are liable to develop into an actual chronic neurosis.

THE ACCESSORY SINUSES.

Inflammation of the Sinus Maxillaris. The most important contribution to this subject which has appeared during the year is the original work of Joseph P. Tunis,¹ of Philadelphia. His article is based on an examination of one hundred heads in the autopsy room of the Allgemeines Krankenhaus, in Vienna, with reproductions of Wood's metal casts of both antra, actual size, from an adult male head; the use of frozen sections of several heads polished by an original method (Fig. 6); careful technique and minute detail of the pathological anatomy. A full description of Professor Ghon's modification of the Harke method of sectioning skulls, in order to explore all of the accessory sinuses, is given (Fig. 7).

After a study of several hundred skulls and over five hundred wet preparations, Tunis calls attention to the very considerable size of the antra, their intimate connection with the frontal and other superimposed sinuses, the extreme thinness of the antral roof, and some anomalous positions for the accessory openings. From his microscopic studies of the preparations from over thirty heads, the epithelium was shown to be universally of the ciliated variety (Fig. 8) and the mucous meni-

¹ Laryngoscope, October, 1910.

brane of the antra to be always rich in glands, especially in the neighborhood of the ostia.

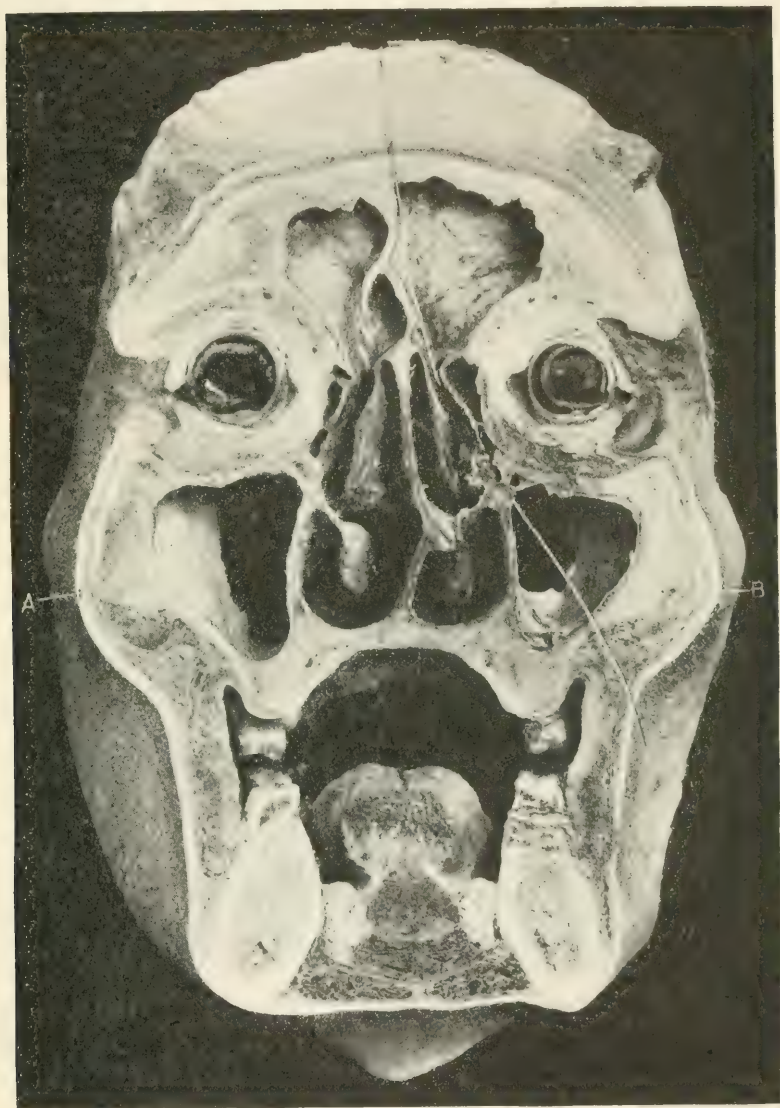


FIG. 6.—Anterior view of a formalin preparation. These antra are somewhat larger than those of the average skull. A bristle passed readily from the left frontal sinus to the left antrum, as shown in this photograph. The distance between the points marked *A* and *B*, or the most prominent parts of the cheeks, was 12.5 cm.

SUMMARY OF MICROSCOPIC FINDINGS. 1. Several slides showed only hyperemia and edema representing the early stage of inflammation in this series.

2. Next there were a number which showed actual suppurative inflammation. These generally showed more or less well-marked epithelial desquamation, infiltration of leukocytes into what remained of the epithelial layer, and generally only a moderate mucoid degeneration of the persisting epithelium. The subepithelial tissues were injected, and, at times, hemorrhagic. They were loose from edema, and occa-

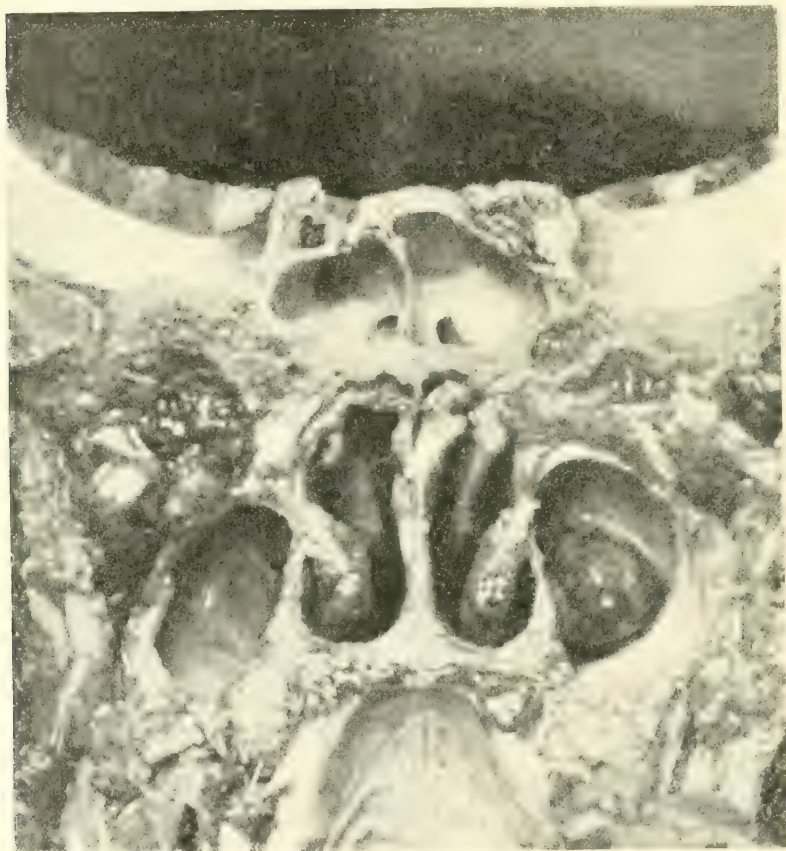


FIG. 7.—Photograph showing the actual size of a multilocular cyst of the right maxillary antrum as seen from behind. This photograph was taken immediately after the skull was opened by the Harke-Ghon method.

sionally showed small deposits of fibrin and enlarged lymph spaces, together with polynuclear leukocytic infiltration, the presence of numerous mononuclear leukocytes, and often a well-marked occurrence of eosin-stained plasma cells. In individual examples, distinct focalization of the leukocyte marked the occurrence of minute abscesses. Commonly there was swelling of the endothelium, of the bloodvessels, and of the lymph spaces. Occasionally, young connective-tissue corpuscles

developing into fibroblasts occurred in these sections. The glands were not always changed, but several specimens showed special pus collections in dilated ducts.

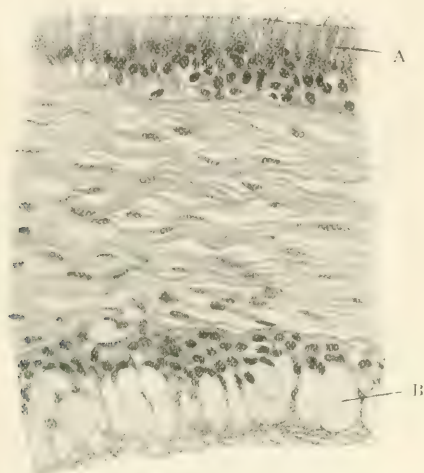


FIG. 8.—Section of the wall of the multilocular cyst showing (A) stratified ciliated columnar epithelium; B, goblet cells. Magnified 300 times.

3. A third group showed a chronic inflammatory process, sometimes with thinning, but often with thickening of the mucous membrane (Figs. 9 and 10). In both cases, the epithelium showed an excessive number of goblet cells. This third group may probably be divided

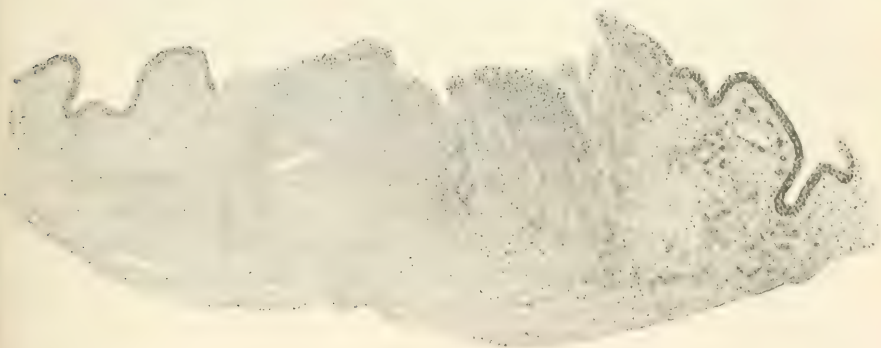


FIG. 9.—Section of the mucous membrane from a case of empyema. This section is magnified 20 times. It shows ulceration of the mucous membrane with a necrotic base surrounded by hemorrhage.

into two subgroups, namely, the atrophic and the hypertrophic form. In the atrophic form, the epithelial layer is usually reduced in the number of strata, and the cells are often lowered in height; this lower-

ing or pressing downward of the cells being especially likely to occur over prominences. The cilia are not always lost, but may be to a greater or less extent. There are generally examples of mucin-bearing goblet cells among them. The subepithelial tissues are fibrous and commonly are rather dense, although a slight edema may occasionally prevail in parts of the membrane. The bloodvessels frequently show



FIG. 10.—*A*, pus corpuscles. *B*, blood corpuscles. *C*, young capillaries. Upper right-hand corner of the necrotic ulcer represented above. Magnified 80 times. This shows hemorrhage, pus corpuscles, and newly formed capillaries. The Gram stain showed the mucous membrane to be rich in staphylococci, many of which are in the phagocytes.

a sclerotic thickening of their walls. Hemic pigmentation occasionally exists, and the glands are either unchanged, atrophic, or not infrequently cystic.

In the hypertrophic form, the epithelium is retained and is generally rich in goblet cells (Fig. 8), ordinarily of normal size and with persistent cilia. The surface of the mucous membrane is apt to be irregular

and sometimes thrown into distinct papillary projections. The sub-epithelial tissues here are fibrous, but show a higher proportion of cellular elements than in the preceding variety. Fibroblasts are usually frequent, while plasma cells and mononuclear leukocytes are generally present, at least about the glands and the bloodvessels. Edema may also occur here, but is usually only of moderate extent. Sclerosed arterioles are not uncommon. The veins are apt to be injected, and hemorrhagic pigmentation also occurs. The mucous glands may be either unchanged, atrophic, or cystic. There was no example of hyperplasia or hypertrophy occurring in this series.

Cysts. The retention cysts in this series occurred regularly in connection with chronic inflammation, apparently more frequently in the atrophic than in the hypertrophic form. They vary in diameter from minute size to a centimeter or more. They are commonly filled with a homogeneous, structureless, eosin-stained material which, from its staining reaction, is evidently not true mucin.

Cause of Death. Of this series of 37 cases, in which microscopic studies were made, tuberculosis, pneumonia, carcinoma, sepsis, heart and bloodvessel disease, each claimed 5 victims, thus accounting for 25 of the cases. Among the remainder, 3 died of cerebrospinal meningitis, 2 of nephritis, and 2 of leukemia. It is only logical to surmise that the death of the patient was hastened in a large proportion of these cases by the presence of inflammation in the antral mucous membrane.

From the microscopic appearances of the sections, the time of duration of the various inflammations present may be briefly summarized as follows: (1) The cases of edema and hyperemia were a matter of only a few days. (2) The examples of empyema or chronic inflammation were of uncertain duration, but it may be taken as an assured fact that those showing the late features of inflammation with epithelial exudate, etc., were of several months' duration, while those of a milder form probably lasted only a few weeks. Cases of chronic catarrh must have lasted for months.

Tunis concludes his paper as follows:

1. In this series of 100 heads, 37 per cent. showed some evidence of pathological changes in the maxillary antra.

2. Of these 37 cases, 11 were examples of edema; 12 of chronic inflammation or empyema; 1 of an alveolar or dental cyst; and 13 of retention cyst.

3. With one or two exceptions all of these cases were undiagnosed during life.

4. The presence of a large amount of pus, in 10 out of 12 of these cases of empyema, may have played an active part in causing the death of the patient.

5. In this series there was no particular disease with which inflammatory conditions of the antra were associated.

6. The cause of death in 21 of these 100 cases was tuberculosis, either of the respiratory or intestinal tract. Nevertheless, there was only one example of a tuberculous condition of the antral mucous membrane.

7. All of the cases of retention cyst were associated with a mild form of chronic atrophic catarrh, while several of the cases showed, under the microscope, a combination of a severe chronic inflammation and retention cyst.

8. The importance of antral inflammation as a factor in causing such diseases as inflammatory rheumatism, hay fever, asthma, and pneumonia is frequently overlooked.

9. The results of the foregoing examinations, combined with the reports of Harke and Fraenkel, should again call attention to the necessity for an early diagnosis of a chronic antral affection, so that prompt remedial measures may be employed.

10. Anatomical research is universally corroborated by clinical experience in the selection of the intranasal route as the most satisfactory one for the performance of the great majority of operations on the maxillary antrum.

After-treatment of Sinus Operations. By means of negative pressure, Henry Horn,¹ of San Francisco, claims that the duration of the after-treatment of the Killian and other operations of the accessory sinuses is considerably shortened. By this method, it can be determined at any time whether a case is really cured or not. He believes that artificial drainage of the accessory cavities by means of negative pressure is a distinct advantage in the after treatment of this class of cases.

The apparatus employed consists of three parts—a nose piece, a pump, and a manometer for determining the amount of negative pressure used. The nose piece is entirely of glass, and is easily cleaned and sterilized. The part which closes the nostril is olive-shaped and fits every nose. At the air outlet is a small glass tube projecting into the interior, which prevents all secretion from entering the rubber tube and thus the pump. The nose piece is roomy and rests on a flat bottom, thus allowing it to be conveniently placed to one side for purposes of comparison or examination. The manometer has a protection chamber on the right which is connected by a movable glass joint and held in place by two springs. This protection chamber is of considerable importance, especially if a water-jet pump is used, for, when the water is suddenly turned off, the water backs up and would otherwise overflow the manometer. In the mercury chamber there is a tiny air intake, so arranged as to prevent the quicksilver from being blown out. Either the ordinary Bier's metal section pump or the water-jet pump may be used.

¹ *Annals of Otology, Rhinology, and Laryngology*, March, 1910.

The method of using the apparatus is as follows: "The olive end of the nose piece is placed lightly but firmly into the nostril, care being taken that the opening is not closed by the mucous membrane of the septum or the inferior turbinate. The wing of the other nostril is held closed with the finger. The patient now sings aloud, continuous 'eeeeeeeeeeeeeeeeee,' by means of which the soft palate is raised, and the nose, together with the nasopharynx, becomes a closed cavity. At the same time, the pump is quickly brought into action, care being taken with a new patient not to exceed 4 to 5 cm. pressure or prolong the suction over ten or fifteen seconds. In the following treatments, the pressure can be gradually raised, but never high enough to become disagreeable to the patient."

The method used by Horn in his Killian operations was as follows: On the third day the gauze strip or rubber drain was removed. On the fourth or fifth day, depending upon conditions, suction was commenced. At the first treatment, a pressure of 6 to 8 cm. for fifteen to twenty-five seconds was used. If mucopus and no blood appears, the pressure can be increased to 12 cm. the following day. Higher than 18 cm. is never necessary. Usually the secretion is at its height on the fifth or sixth day, and then rapidly diminishes, so that, in favorable cases, on the eighth day the nose is entirely dry.

Hexamethylenamine in Sinus Suppuration. The favorable results obtained by Barton with hexamethylenamine in suppuration of the middle ear, suggested to Edward J. Brown¹ that the drug would also be eliminated through the mucous membrane of the nasal sinuses and have a beneficial influence on suppuration in these cavities. He employed it in two cases, the first being a female, aged twenty-six years, suffering with an acute suppuration in the ethmoid cells. The head of the left middle turbinate was resected, and 5-grain tablets of hexamethylenamine administered three times daily. Three days after instituting this treatment the ethmoid suppuration was practically well.

In the second instance, Brown's personal case of chronic suppuration of the right antrum, dating back to 1889, had been less troublesome since the head of both middle turbinals were removed, but had always been renewed with every new cold in the head. He was slowly recovering from an attack which had lasted all winter, persistent discharge of yellow pus and an unpleasant subjective sense of fetor when the sinus discharged its contents. Within forty-eight hours after beginning the 5-grain doses of hexamethylenamine, the yellow discharge had practically ceased, the sense of fetor had wholly disappeared, and after six days' use of the drug the only discharge noticeable is white, mucoid, and very slight, and the head feels greatly relieved.

Vaccine Therapy in Chronic Sinus Disease. The results obtained in 4 cases of chronic sinus disease treated by vaccines lead Birkett and

¹ Journal of the American Medical Association, April 16, 1910.

Meakins¹ to doubt the importance of bacterial infection in the perpetuation of these lesions. In 3 of their cases a growth was readily obtained before the vaccine treatment was instituted, but in the fourth case repeated negative results were very significant of the lack of bacterial infection. After treatment by homologous vaccines, a certain improvement occurred, but this was not so much in the quantity of the exudate as in its character. The smears revealed a practically pure mucoid condition of the discharge, and the absence of organisms was very striking. In addition to this, the repeatedly negative results of cultures in all the cases afford strong presumptive proof that the bacteria had been destroyed by the vaccine treatment. But, in spite of this, the discharge remains and the symptoms are practically all due to this continued secretion and partial retention. This hypersecretion may be explained by the following facts: (1) The submucous layer of the lining of these cavities has become chronically thickened, and thus the reabsorptive power has been lost; (2) the ostia have become partially closed, due to the swollen mucous membrane, and thus drainage is defective; and (3) due to repeated stimuli, most likely bacterial at first, the mucous membrane has acquired the habit of hypersecretion. This hypersecretion is most likely started by bacterial action, but after a time it becomes a true habit, independent of bacteria, as is evidenced by its perpetuation after the cavity has been practically sterilized. They have had no experience with vaccine treatment in acute inflammation of the accessory sinuses, and while the results of others have been very successful, the majority of such cases recover without treatment, and it will require a large series of cases to determine whether the incidence of chronic inflammatory disease is reduced by vaccine treatment. There is a class of cases, however, for which vaccine therapy is particularly indicated. These are what may be called the subacute cases, or those following acute sinusitis, which give indications of becoming chronic. In such cases the use of vaccines would most likely sterilize the cavities, and thus remove the exciting cause before the chronic changes have occurred.

THE PHARYNX

Congenital Insufficiency of the Palate. This condition is defined by A. Brown Kelly² as a congenital affection in which the soft palate does not effect the physiological closure of the nasopharynx from the oral cavity, and *rhinolalia aperta* results.

The imperfect closure may be due to submucous cleft palate or muscular insufficiency of the palate.

¹ Laryngoscope, September, 1910.

² Journal of Laryngology, Rhinology, and Otology, London, June and July, 1910.

Submucous cleft palate is characterized by the presence beneath the intact mucous membrane of a notch or gap in the posterior part of the hard palate, and the imperfect union in the middle line of the muscles of the two halves of the soft palate, also by a shortening of the hard and soft palate.

In submucous cleft palate the epithelial coverings of the palatal processes have united across the middle line, but development has been interrupted before the mesoblast contained in these processes has also effected a meeting.

A submucous cleft palate may be sufficient or insufficient according as rhinolalia aperta is absent or present.

The conditions in submucous cleft palate which determine sufficiency or insufficiency are: The length of the hard and soft palate, the degree and mode of elevation of the soft palate, the depth of the pharynx, the degree of prominence of Passavant's cushion, and the amount of approximation of the palatopharyngei.

Submucous cleft palate without insufficiency is present in about 20 per cent. of those with bifid uvula.

In an examination of over 3500 skulls, only two and a doubtful third were found in which the anatomical condition of the palate corresponded to that present in marked cases of submucous cleft palate as revealed by palpation, measurement, and *x*-ray examination. Specimens showing a slight degree of cleavage were not infrequently met with.

Congenital muscular insufficiency of the palate is characterized by imperfect elevation of the palate during phonation, owing to defective or abnormal muscular action.

In congenital muscular insufficiency there are no signs of interrupted development, such as are associated with submucous cleavage of the palate, *e. g.*, notching of hard palate, non-union of muscles in middle of soft palate, bifid uvula, shortness of hard and soft palate.

The cause of muscular insufficiency of the palate is probably not a paresis, for the following reasons: The rhinolalia aperta is noticed from the time the child begins to speak; there is nothing in the early history to account for a paralysis, there are no associated paralyses, and the insufficiency is due, in some cases at least, not merely to want of power to raise the palate, but to the elevating force being misapplied.

The probable cause of congenital muscular insufficiency of the palate is the defective or unequal development, or abnormal disposition, of the muscles of the soft palate. The occurrence of such conditions is known anatomically, but their relation to the disease under discussion has not yet been proved.

Minor degrees of these muscular abnormalities may be present without insufficiency.

The insufficiency in submucous cleft palate is due to the palate being too short or too far from the posterior pharyngeal wall; the insufficiency

in congenital muscular insufficiency is due to neither of these causes, but to the weak and ineffective action of the levators of the palate.

Average measurements in submucous cleft palate show: (1) That both hard and soft palate are shorter than normal. (2) That the amount of shortening corresponds, as a rule, to the degree of insufficiency. (3) That the pharynx is only slightly deeper than normal. In congenital muscular insufficiency the measurements scarcely differ from the normal.

The speech is similarly affected in both varieties of congenital insufficiency of the palate, but, while in submucous cleavage there is simply rhinolalia aperta, in muscular insufficiency certain of the letters may also be imperfectly formed.

The absence of regurgitation in all of the cases proves that deglutition can be satisfactorily performed with a palate which is either too short to reach the posterior wall of the pharynx, or in which the muscular action is insufficient to bring it into contact with the posterior wall of the pharynx.

The ears are affected in nearly 80 per cent. of all cases; in submucous cleft palate the complications are more frequent and more severe than in muscular insufficiency.

The mental and physical development of subjects of congenital insufficiency of the palate are sometimes much below the average.

Various objective conditions have been pointed out as more or less commonly associated with submucous cleft palate, *e. g.*, scarring of the mucous membrane near the notch, bifid uvula, stretching of the pillars of the fauces, increased obliquity of the posterior edge of the septum, harelip. In addition, attention is here directed to the appearance of the soft palate, which presumably arises from non-union of the muscles in the middle line, and to the occasional presence of a supernumerary tooth.

Functional rhinolalia aperta lasting for months is the only affection likely to be confused with congenital muscular insufficiency of the palate; consideration of the history of the case will allow of a distinction being drawn.

The prognosis in children in slight cases is favorable; some make a perfect recovery. Marked cases and adult subjects may be improved, but a considerable degree of rhinolalia aperta usually persists.

The best treatment is probably Gutzmann's method of massaging and stretching the soft palate.

Disturbances in the Upper Air Passages with Leukemia and Pseudo-leukemia. Imhofer¹ discusses the manifestations, in the throat and nose, of a tendency to leukemia and pseudoleukemia. With leukemia, the mouth and throat may present a diffuse catarrhal affection, or the

¹ Centralblatt für die Grenzgebiete der Med. und Chir., Jena, April 4, 1910.

lymphatic tissue, follicles, and tonsils may alone be involved, or the lesions may be of an ulcerative or gangrenous nature. In differentiation, great stress should be laid on a striking and rapidly increasing enlargement of the tonsils—they may become four or five times the normal size; small suggillations are also characteristic. When such are discovered, the blood should always be examined under the microscope. Hanszel has reported a case of acute leukemia in which a deep ulcer developed in the tonsil, involving the uvula, and staphylococci were cultivated from the lesion. The connection with an angina is particularly evident in a case reported by Hanszel, in which a young man had a severe sore throat, followed by fatigue and emaciation after a fall from a horse. Four weeks later the angina recurred, with ulceration in the tonsil, enlargement of the glands throughout, and death in four weeks from acute leukemia. Kubler found a yellowish deposit on the gums and tonsils in a previously healthy soldier, and their leukemic nature was evident, as a tendency to hemorrhages at various points and multiple glandular tumors were also observed. In 4 cases on record, operations for removal of adenoid vegetations or enlarged tonsils in leukemic children proved fatal. In 1 case, the child died suddenly several hours after an extensive postoperative hemorrhage. In the other cases, two, three, or four weeks elapsed after the operation before the child had succumbed to increasing weakness and aggravation of the signs of leukemia, suggesting that the operation had transformed a chronic leukemic process into an acute form. The danger of hemorrhage is thus not the main peril in operations on the upper air passages in leukemia; the possibility of arousing a mild chronic process to severe acute manifestations must be considered. In one of the above cases this transformation did not occur until after a second operation for recurrence of the leukemic enlarged tonsils and adenoid growths. Consultation with the little patient's family physician is extremely important, if practicable, before attempting any operation on adenoids or enlarged tonsils. On the slightest suspicion of leukemia the most careful examination should be made, and only when leukemia can be certainly excluded should the operation be performed except for vital indications. Especially suspicious is the simultaneous enlargement of all the tonsils and of the regional glands, although such may be encountered with tuberculosis. Rapid recurrence after operation is also suspicious of leukemia, also when the swollen parts are redder than with tuberculous lesions and the tumor seems harder; edema is not observed as in tuberculous lesions in the throat. The blood findings are the main reliance for differentiation. Lymphosarcoma is distinguished by its progressive encroachments in the vicinity. Treatment of leukemic affections of the nose and throat can be only symptomatic, and that for leukemia in general and this has little to show to its credit. Tracheotomy is indicated as a last resort, but did not avert the fatality in the cases on

record. In one there was necrosis of the fascia and fatal bronchopneumonia; pressure necrosis and gangrenous destruction are liable also after intubation. The same conclusions apply to pseudoleukemia and to lymphosarcoma, except that the course of the latter is more prolonged, as a rule, and patients with lymphosarcoma stand operations much better than those with leukemia or Hodgkin's disease. Beale, Storck and others have reported long survivals after removal of the lymphosarcoma, and Abercrombie performed three operations for recurrence, the patient finally succumbing to a complicating erysipelas. Lymphoid and myeloid chloromas seem to stand midway between leukemia and lymphosarcoma, but they do not involve adjoining tissues, and there is no enlargement of the spleen.

Anemic Ulcers of the Throat. Albert G. Pohly¹ believes that ulcers of the throat may be due to anemia or lowered vitality. He has observed 3 cases, all in young anemic women. In 2 cases the ulcer occurred on the tonsil, while in the third it appeared on the uvula. The ulcer is round, small, with scanty secretion. There was no history of either tuberculosis or syphilis, and no glandular enlargement.

G. F. Lydston,² Chicago, takes exception to Pohly's diagnoses of anemic ulcer on the ground that the cases were not thoroughly investigated. He apparently regards them as cases of syphilis.

Retropharyngeal Abscess. Three unusual cases of retropharyngeal abscess are reported by Spingarn,³ the first case being associated with evidence of pressure on the pneumogastric nerve. The two striking points in connection with this case were the initial torticollis and the external cervical adenitis, and the remarkably slow pulse (60), that could only be explained on the basis of pressure on the pneumogastric. The second case was followed by general pyemia and death. The history of this case was typically that of a general pyemia following a retropharyngeal abscess, and strikingly emphasizes the importance of making a prompt diagnosis of the latter condition and instituting early drainage. The third case was complicated with edema of the glottis, the patient recovering.

Rupture of Vessels of Neck into Pharynx in Scarlet Fever. The two cases reported by Griffiths and Riddell⁴ are of interest. The first case, a boy, aged nine and one-half years, was suffering from a mild attack of scarlet fever, which ran a normal course for twenty-three days. On the twenty-fourth day the patient complained of pain on the right side of the neck, with considerable swelling and a rise of temperature. Each day these symptoms increased, and, on the fourth day, the right tonsil was seen to be pushed forward by a large swelling behind it, and the

¹ New York Medical Journal, August 27, 1910.

² Ibid., October 8, 1910.

³ Medical Record, September 24, 1910.

⁴ Glasgow Medical Journal, January, 1910.

right side of the palate was also inflamed. An incision was made in the protruding tissue, but no pus found. Next day there was still no pus present, but upon digital examination the swelling was found to be quite soft, and the tip of the finger entered a cavity behind the tonsil. Upon the withdrawal of the finger, profuse venous hemorrhage took place, and, proving uncontrollable, death ensued instantaneously. Upon postmortem examination, no ulceration of the fauces or tonsil was detected, but behind the right tonsil was an irregular-shaped cavity, the inner wall of which was broken down, the outer wall being connected with the internal jugular vein. There was considerable enlargement of the glands of the neck. It is probable that a deep lymph gland had broken down, involving the coats of the internal jugular vein, from which vessel blood oozed into the surrounding tissue, giving rise to the swelling behind the right tonsil.

In the second case, rupture of the internal carotid occurred suddenly. The patient was a boy, aged three and one-half years, suffering from a mild attack of scarlet fever. On the seventeenth day from the date of the eruption, the temperature suddenly rose. An enlargement of the glands took place externally, and a slight deposit on both tonsils became evident. Five days later the child was practically well, except for the glandular enlargement, which still persisted, although the temperature was normal and only slight ulceration was visible. While sitting up in bed taking some rice pudding, the child gave a sudden cough, which was followed by profuse arterial hemorrhage, and death ensued immediately. Postmortem examination revealed a breaking down of the glands on the right side of the neck. At the level of the angle of the jaw, just behind the pharyngeal wall, a small cavity was disclosed filled with blood clot. The walls of this cavity were ulcerated, and, at the upper part, the internal carotid artery was involved in the ulceration. In neither of these cases was there any symptoms indicating implication of the vessels.

Nasopharyngeal Origin of Chorea. The theory that chorea has its origin, in the majority of instances, in a septic condition of the nasopharynx is advanced by de Ponthiere,¹ who is firmly convinced that its rapid and permanent cure depends upon surgical treatment directed to the nasopharynx. He says that chorea is in reality only a prominent symptom and not a morbid entity, and that there exists a striking analogy between the symptoms of chorea and auto-intoxication of nasopharyngeal origin, which he believes clearly explains the infectious origin of chorea. When the tonsils or adenoids are infected, they continually secrete septic products, which enter the circulation and slowly, but surely, poison the whole economy. This chronic auto-intoxication admirably prepares the ground for producing all diseases, and particularly nerve

¹ *Journal of Laryngology, Rhinology, and Otology*, London, September, 1910.

disorders, and when one knows that common constipation produces symptoms of meningism, especially in children, there is nothing astonishing in a nervous system, habitually bathed in and nourished by a blood which carries septic principles, showing its condition of discomfort by choreiform manifestations.

The infection, which has its source in the nasopharynx, may be of different kinds, but it is none the less true that it is the infection of the rheumatic type which predominates in this region, and which lurks in the tonsils and in the adenoids before giving origin to articular or visceral complications. All the erythematous and pultaceous anginas of infancy are serious warnings. It is these which, by their repetition, establish in after years the more or less accentuated, but pure, arthritic type. It is well known how frequently these acute rheumatic or gouty anginas, disappear to give place to arthritis or cardiopathies. It is a no less established fact that articular rheumatism commences, not in the articulations, but generally in pharyngeal manifestations. The influences of the eruptive fevers in favoring the origin of chorea is explained by the fact that after these fevers a pharynx, which was previously healthy, has become infected and noticeably hypertrophied, and the case then presents all the symptoms which result from nasopharyngeal obstruction and infection.

The fact that chorea does not occur in all tonsil and adenoid cases, de Ponthiere explains on the basis that they are not all infected; in the second place, because the infection of the nasopharynx may present every degree of virulence, quality, and septicity of the microbic flora there located, and especially because the soil is not the same in all.

Prevalence of Adenoids. Macleod Yearsley,¹ of the Royal Ear Hospital, has concluded an investigation into the occurrence of adenoids in three of the London elementary schools. He finds that about 37 per cent. of the children have adenoids, and that between 72 and 76 per cent. of these have also enlarged tonsils. On an average of 31.2 per cent. of these children are mouth breathers, complete or partial, but hypertrophy of the faucial tonsils may give rise to mouth breathing in the absence of adenoids. Sex appears to have no influence on the incidence of adenoids, and they are most common about the age of eight, and next about the age of twelve. True aprosopia occurs in about 4.7 per cent. of adenoid cases; it is more frequent in girls, and is associated with a marked degree of adenoids. Aprosopia is often confounded with dulness due to defective hearing. The so-called adenoid facies is uncommon, except in association with a marked degree of adenoids. The association of an abnormally high palate with adenoids is rather due to peculiarities of cranial formation than to extra-uterine influences of nasal stenosis, and if there is any relation between

¹Journal of the American Medical Association, May 21, 1910.

a high, narrow palate and adenoids, it is possible that the palate shape is rather a cause of adenoids than *vice versa*. The presence of adenoids has more to do with the presence of carious teeth than have mouth breathing and palate shape, and this is probably due to the increased tendency to oral sepsis in children with adenoids. Irregularity of the upper incisors is less a result of adenoids than palate shape. The percentage of ear complications in adenoid children is about 10.8 and adenoids are probably by far the most important factor in the etiology of ear disease in childhood.

THE TONSILS.

Bacteriology of the Tonsils. David J. Davis,¹ Chicago, made an experimental study of the bacteria isolated from the tonsils of 45 patients, both before and after excision, with a comparison of the flora from the surface and in the crypts. The tonsils, usually enlarged, were obtained from patients with a variety of clinical conditions, including chronic joint affections, nephritis, endocarditis, rheumatic fever, recurring tonsillitis, etc.

The excised tonsils were at once placed in a sterile receptacle and taken to the laboratory, where smears and blood-agar plate cultures were made first from the surface. The tonsil was then incised with a hot sterile knife, thus exposing the crypts, and from these similar smears and cultures were made. In many cases, anaërobic cultures were also made. In almost every case a pure growth or a nearly pure growth of *Streptococcus pyogenes* was obtained from the crypts. This was true regardless of the clinical condition of the patient. From the surface of the tonsils the flora, as a rule, was strikingly different from that in the crypts. The predominating organisms on the surface belong to the pneumococcus group, all producing green colonies on blood-agar, and some, but not all, being inulin fermenters. In many cases streptococci were also present on the surface, but they were relatively few, even when the crypts contained them in large numbers. In some cases examination of swabs taken from the surface of the tonsils just before tonsillectomy gave results similar to those obtained afterward. Not infrequently pneumococcus-like colonies were obtained from the depths of the tonsils in considerable numbers, but, as a rule, the number was in more or less direct proportion to the tissue laceration and contamination of the depths of the tonsil by surface organisms.

Anaërobic cultures gave, as a rule, few organisms, and none of the varieties found occurred with any degree of constancy or appeared to be significant. In two cases, a practically pure growth of *Staphylococcus albus* was obtained from the crypts. In most cases staphylo-

¹Journal of the American Medical Association, July 2, 1910.

lococci were not present at all, or only an occasional colony occurred on the plates. Occasionally long thread-like bacilli were seen in smears; these were not cultivable. In one case of recurrent tonsillitis, the last attack being four weeks previous to the tonsillectomy, cultures from the crypts gave a nearly pure growth of *Bacillus diphtheriae*, while cultures from the surface of the tonsils, taken both before and after excision, did not reveal this organism. There is good reason to believe that an outbreak of several cases of diphtheria, occurring at this time in persons closely associated with this patient, may be thus explained. This case, therefore, is an example of a diphtheria carrier in which the bacilli were present in the tonsillar crypts and were not revealed by the ordinary method of examination. All strains of streptococci were tested on dextrose, lactose, mannite, raffinose, and inulin. All fermented dextrose, and none fermented raffinose and inulin. A large number of the strains fermented lactose, and a smaller number fermented mannite. They may, therefore, be divided into well-defined groups with reference to mannite and lactose fermentation. This grouping bears no evident relation to the clinical condition. Similar groups are observed in strains of streptococci isolated from other sources, which is in accord with the findings of others.

The virulence of the twenty-five strains of streptococci isolated from the tonsils was tested by intravenous injections into rabbits. Acute arthritis developed in nearly every instance, followed usually by death in from a few days to three or four weeks. The arthritis usually appeared from the third to the fifth day, manifested by lameness and swelling of the joints. When large doses were given, the arthritis was usually more general and appeared earlier, the animal soon dying of septicemia. The most suitable dose was the twenty-four hour growth from the surface of one small blood-agar slant. A number of animals recovered, no trace of the joint lesions remaining. In three instances chronic lesions occurred, manifested by enlarged and deformed joints, and exostoses about the joints. In a few cases, one joint only was attacked, but, as a rule, the arthritis was multiple, in several cases involving nearly every joint in the body, including the vertebral joints. The various joints of the fore and hind limbs were about equally involved.

Postmortem examinations revealed the fact that not infrequently, in the early stages, the involvement was periarticular, often involving the tendon sheaths. Later, the joints might become infected. The exudate in the joint early was usually gelatinous and slightly turbid, containing leukocytes and streptococci. This was frequently found when there was no external evidence of arthritis. Later, the exudate became more purulent, and even at times almost caseous in appearance. The streptococci were always readily recovered from the joint fluid. In some cases, but not in all, they were isolated from the heart's blood, and at times from the peritoneal cavity.

Multiple arthritis, followed by death in two weeks, was produced in a monkey (*Macacus rhesus*) by intracardiac injection of one of the strains of streptococci. In no case did endocarditis occur. The various strains of streptococci from the tonsils, regardless of the clinical condition of the patient, appear to differ little in their power to produce arthritis in the animals inoculated.

The organisms of the pneumococcus group (six strains tested) in no instance produced arthritis in rabbits. An organism of this type, which produced green colonies on blood-agar-fermented inulin, and which was isolated from the depth of the tonsil of a patient with multiple arthritis not associated with endocarditis, produced, upon intracardiac inoculation into a rabbit, an extensive vegetative mitral endocarditis, with typical large renal infarcts associated with septicemia. There were no joint lesions.

Neuralgias and Functional Disturbances from Tonsil Infections. Frank C. Todd¹ considers the nerve supply and lymphatic connections of the tonsil, and the part played by the diseased tonsil in the production of functional disturbances and neuralgias. He concludes:

1. Pain and soreness in the neck in the region of the tonsils usually arise from diseased tonsils.

2. Neuralgias in the region of the tonsil, ear, side of head, neck, nose, teeth, gums, or antrum of Highmore may be, and frequently are, caused by diseased tonsils.

3. Disturbances of function through pressure on or inflammation of nerves may manifest itself in hoarseness, loss of voice, cough, difficult deglutition, or entrance of food into the trachea, with regurgitation, or in defects in hearing, dyspepsia, and disturbed heart action.

4. Such diseased tonsils may not be and usually are not large or acutely inflamed. They must be carefully examined by the surgeon, who should pull them into view with a dull hook, determine whether the crypts contain detritus, whether the tonsils are sore to such manipulation, bleed easily, or otherwise give evidence of being diseased.

5. Such tonsils should be carefully and completely removed.

6. Relief of secondary infections usually follow immediately on removal, but sometimes only slowly, if neuritis or secondary glandular involvement is present.

7. In certain cases paralysis may be permanent.

Nephritis following Tonsillitis. Loeb² observes that acute nephritis results from acute tonsillitis far more often than is generally believed. The symptoms, ordinarily, are not manifested until some time after the inception of the disease. The nephritis is of the hemorrhagic type and differs from that of scarlet fever in that pyrexia, edema, and

¹ Journal of the American Medical Association, August 27, 1910.

² Ibid., November 12, 1910.

oliguria are not marked symptoms of the disease. In addition, it follows the angina, and is not concomitant as in scarlatina and diphtheria. Judging from the course of the cases reported, there must be many in which a mild nephritis occurs incident to tonsillitis, which goes on to resolution without the patient or physician being conscious of its presence. As each case of lacunar tonsillitis may be a potential source of acute nephritis, it is incumbent upon practitioners to observe the urine, not only during the height of the disease, but for some time after as well. Spontaneous or idiopathic nephritis is probably often due to a tonsillitis which has not been considered as an etiological possibility. Chronic affections of the kidney may very well owe their origin to unrecognized acute attacks of nephritis of tonsillar origin. Much light may be shed on this subject by a study of the urine in a large number of cases of acute tonsillitis.

Tuberculosis of the Tonsils. Levy,¹ of Denver, says that tuberculosis of the tonsil occurs more frequently than previously recognized, owing to newer methods of investigation. Clinically, tuberculosis of the pharynx, with or without tonsillar involvement, must still be looked upon as among the rarer manifestations of tuberculosis. Clinical tuberculosis of the tonsils, and that determined by histological examination, present marked differences. They are differentiated by the absence of symptoms in the latter, and definite subjective and objective manifestations in the former. Many of the histological findings attributed to tuberculous changes occur in other pathological conditions. The diagnosis of true tuberculosis of the tonsils is more satisfactory when based upon definite physical signs corroborated by typical histological findings. It is not necessary to attribute all forms of cervical adenitis to tuberculosis. Tuberculosis of the tonsil may be considered the result of a local reaction. The clinical form must be looked upon as very grave, its curability being extremely doubtful. Extirpation of the tonsils is rarely indicated in clinical tonsillar tuberculosis. In the presence of cervical adenitis, lowered resistance, and evidences of malnutrition, the best interests of the patient will be subserved by radical tonsillectomy, even though other well-recognized indications for the operation be absent.

Enucleation of Tonsils. Joseph C. Beck² believes that, with the rarest exceptions, whenever the tonsil requires surgical interference, enucleation should be the procedure adopted. The following are some of the conditions mentioned by Beck as being distinctly and beneficially influenced by complete enucleation.

(1) *Local conditions affecting the tonsil itself:* Chronic lacunar amygdalitis, in which there are repeated acute attacks, or repeated attacks of peritonsillar abscess. Tuberculous tonsil. Primary chancre of

¹ Journal of the American Medical Association, October 29, 1910.

² Ibid., October 29, 1910.

the tonsil. Malignant disease of the tonsil. Acute infections, such as diphtheria, scarlet fever, etc. (2) *The regional conditions are:* Chronic persistent pharyngitis, especially lateral. Tubal catarrh associated with middle-ear disease. Enlarged glands of the neck. Apical tuberculous infection. Perpetuating bronchitis in children. (3) *General or systemic conditions:* Rheumatism, with its complications and sequelae, as, endocarditis and myocarditis, arteriosclerosis, arthritis, pericarditis, pleurisy, peritonitis, perineuritis, and myositis—so-called muscular rheumatism. Blood changes, as chronic septicemia with secondary anemias. Gastro-intestinal disturbances, such as gastro-enteritis and duodenal catarrh, with a subsequent cholangitis. Parenchymatous changes, such as parenchymatous nephritis, hepatitis, and pancreatitis. Changes in the special organs, as episcleritis and phlyctenular keratoconjunctivitis.

In concluding his paper, Beck advances the theory that the opsonic index of the blood is raised to all infections when the tonsils are enucleated. "If, for instance, there exists some pathological condition of the body, near to or distant from the tonsils, which refuses to yield to the treatment applied to the said condition, if there exists merely a lack of healing power, due, most probably, to the constant absorption of toxic matter from the diseased tonsils, and if this toxic absorption is done away with by the complete enucleation of the tonsils and the pathological condition heals, is it not reasonable to assume that the drain on the system has thus been stopped and the blood given a chance to become powerful enough to cure the disease in question because of the enucleation of the tonsil? For example, operation is performed several times for osteoperiostitis of the zygoma, but the tissues refuse to heal in spite of all treatment, medical as well as surgical. The tonsils, which are diseased, are enucleated, and the disease of the zygoma promptly heals, while every other evidence of marked improvement in the general health is presented. Again, we all recognize the increase in weight and improvement in the general health, especially in children, after the removal of the tonsils and adenoids. Such results as these are more than mere coincidences, and, to my mind, can best be explained by the above-mentioned theory."

R. R. Shurly¹ discusses the difficulties and contraindications of enucleation, and takes a more conservative view of the tonsil question. He states that the normal tonsil should not be disturbed, particularly in early infancy. Simple hypertrophied tonsils may be removed satisfactorily with the tonsillotome. Pathological tonsils, especially those of the submerged type that produce well-defined local or general symptoms, should be completely removed within the capsule. In children, tonsillectomy requires a general anesthetic, preferably

¹ Journal of the American Medical Association, October 29, 1910.

ether. This should be a hospital operation when possible. Tonsillectomy is an operation that should be restricted to those who are especially qualified. The removal of the velar lobe and the complete separation of the pillars are the most important parts of the tonsil operation. Tonsillectomy is not indicated in all cases of so-called rheumatism. Complete enucleation is usually attended by more pain, a longer period of convalescence, and greater danger of infection than tonsillotomy. When tonsillectomy is skilfully performed, the hemorrhage is less than when the average tonsillotomy is done. Tonsils which have been involved in recent acute inflammation should not be operated upon until all evidence of the acute condition has subsided. Many tonsils seen by the general practitioner, with every appearance of serious pathological condition, never develop local systemic symptoms.

Complications of Tonsil and Adenoid Operations. The fact that, notwithstanding the abundance of literature on tonsils and adenoids, comparatively little is said of the complications of operation on these organs is commented upon by Bourack.¹ Contrary to the opinion of Onodi and Rosenberg that serious accidents after adenotomy are a very rare exception, he finds, in his personal experience and his literary research, no foundation for extreme optimism. Bad results are seldom published, but he believes that there are a considerable number of such cases.

He divides the complications of these operations into hemorrhages, lesions of neighboring parts, constitutional affections, intercurrent diseases, accidents, infections, ear lesions, nervous affections, psychic disturbances, pulmonary diseases, and affections of the glands.

The most frequent and often alarming complication is hemorrhage. Nettebrock has collected 150 cases of serious hemorrhage, with 7 fatalities, following removal of the faucial tonsils. Burner found 40 cases of free bleeding, and 7 deaths, after adenotomy. Bourack's personal statistics include 3 cases of very abundant hemorrhage, followed by marked anemia, in 750 tonsillotomies and 5 cases of profuse hemorrhage in 1500 adenotomies. After many trials of different hemostatic agents, he succeeded in controlling the bleeding in 1 case by digital pressure for one hour; in another, by the compressor of Mikulicz; and in a third, the hemorrhage was arrested by syncope. The hemorrhage was late in only 1 case, occurring on the fifth day after adenotomy. In 1 case, the alarming hemorrhage began in the night following operation. When ice, adrenalin, etc., did no good, he resorted to a new curettage, which quickly stopped the bleeding. In his own cases the hemorrhage was due to the incomplete removal of the adenoids, or the laceration of the pharyngeal mucous membrane. In some instances

¹ Archiv. Internat. de Laryngol., d'Otol., et de Rhinol., January-February, 1910.

the hemorrhage is due to hemophilia or leukemia, occasionally to disease of the heart, kidney, etc., but the most serious danger is an anomaly of the vessels. These hemorrhages are rare, but it is well to be prepared for them. Death has been known to supervene on a lesion of the internal carotid. Anomalies of the ascending pharyngeal artery, especially aneurysm, which easily escape the notice of the operator may lead to the most serious hemorrhage as a result of adenotomy. The tonsillotome is responsible for many hemorrhages, but the same accident may follow the use of other instruments, even the galvanocautery. The opening of a peritonsillar abscess may be followed by fatal hemorrhage. Bourack does not employ sharp curettes and avoids forceps, which may produce lesions of the vomer. He opposes exploration of the cavity by the finger in the course of the operation as a procedure contrary to good surgery. He believes that a certain proportion of the hemorrhages would be avoided by taking a thorough history and making careful examinations previous to operations.

Injuries to the surrounding structures are often dependent not upon anomalies, but upon inexperience, too great violence, and poor assistance. Among the intercurrent affections must be mentioned scarlatina, diphtheria, typhoid fever, and measles. Sometimes an urticaria or other eruption follows the operation, but soon disappears. General infection is fortunately very rare, although cases of fatal pyemia have been reported. Affections of the ear are not very rare. Bourack has noted 3 cases of suppurative otitis, 1 with mastoiditis, and 2 of catarrhal otitis. Nervous affections are rarely reported. Holme has reported a case of paralysis of the palate lasting three days, and Bourack has seen one, which persisted for four months, supervene on the day after operation. Pulmonary complications are very rare. Groenbeck has described 4 cases of phlegmonous adenitis following adenotomy.

Among the exceptional accidents, Bourack cites the following: Albumin in the urine after adenotomy, which quickly disappeared. A case of Gibb Wishart's, in which the temperature began to rise one to two hours after the removal of three tonsils, reached 41.6° C. (106.9° F.); the glands became edematous, and death occurred twelve hours after operation. A case of Bergh, in which a child, aged seven years, was taken, after tonsillotomy, with reflex vomiting, followed by a hemorrhage which threatened the life of the patient. A case is reported by Ter Kuile, in a child, aged seven years, with gangrene within eight days after tonsillotomy, and death in a short time.

Bourack concludes: (1) Adenotomy and tonsillotomy are not as harmless as the current opinion would indicate. (2) A careful general examination of the patient and a full history may avert a certain number of serious accidents. (3) One should keep in mind all the factors capable of inducing active or passive hyperemia in the region to be operated upon. (4) Operation should be done only in an appropriate

place free from infection, and with good assistance, and with all preparations made for hemorrhage or other complications. The operation should be done only in a clinic, hospital, or private sanatorium, where the patients should be detained from one to three days after the operation.

Benjamin D. Parish¹ reports a case in which surgical subcutaneous emphysema occurred as a complication of tonsillectomy. The patient was a male, aged twenty-eight years, who was first seen by Parish ten minutes after operation, when his breathing was rapid and shallow; pulse about 128 and thready; face livid and lips cyanosed; his head and neck were extended far back and quite rigid; skin cold and moist. The entire neck puffed out so that the line of the jaws were practically obliterated, both cheeks and right eyelid swollen, and the crackling of emphysema easily detected over this entire area as far down as the last rib anteriorly, but none posteriorly. After prying open the jaws, putting on tongue forceps, and bending the head and neck forward, the general condition became rapidly better. Stimulants and enteroclysis were administered. It was noticed that the emphysema which had been increasing with the neck in the extended position remained stationary when flexed. An examination showed no evidence of any injury to the larynx or trachea. The faucial tonsils had been well removed. There was a small buttonhole in one left pillar. No hemorrhage or unusual condition of the pharynx was seen. The small blood clots at the field of operation were not removed. Nares showed no signs of injury. Chest negative. The patient rallied from the shock, his respiration became normal, and in about three days the emphysema had been absorbed from neck and face, though it took two weeks to disappear from the chest. Patient made a complete recovery.

Packard² believes that if the general practitioner and the public were aware of the many unreported deaths which occur in connection with the removal of tonsils and adenoids, the almost universal opinion as to the comparative insignificance of the operation would be considerably modified. He considers that all these operations should be done in a hospital, but not infrequently finds it difficult to persuade the patient's family and doctor to take the same view. As to the method of operating, he considers the consensus of opinion to be now so strongly in favor of complete ablation of the tonsils that a competent laryngologist will very seldom perform the less complete operation. Ether is to be regarded as the safest anesthetic in these cases, and may be preceded by ethyl chloride.

He reports one fatal case, that of a little girl, aged three and one-half years, with enlarged tonsils and a considerable mass of adenoids, but otherwise apparently healthy. The anesthetic was ethyl chloride followed by ether given by the drop method, a metal mouth-piece being

¹ Laryngoscope, November, 1910.

² American Journal of the Medical Sciences, September, 1910

used. The operation passed off as usual, but about five hours later the color became rather poor and the pulse and respiration rapid. Two hours after this slight retching occurred and respiration ceased. Tracheotomy was performed, but the trachea contained no blood or vomitus, and death took place. No autopsy was obtainable, but Packard regards it as practically certain that the fatal result was due to status lymphaticus.

THE LARYNX.

Direct Intubation of the Larynx. An instrument for direct intubation has been devised by Mosher,¹ which consists of a pair of alligator forceps, the lower blade of which is broadened out into the shape of a cup, whereas the upper movable blade is extended into an obturator (Fig. 11).

The upper blade acts as an obturator for introduction, and as an extractor. Three obturators screw into the base of the upper blade, and these fit all sizes of tubes, from the smallest for the infant to the largest adult tube. Each obturator has a joint in the middle which allows the lower half to tilt upward during withdrawal (Figs. 12, 13, 14, and 15). *

The tube is introduced with the patient on the back and with the head over the end of the table. In this position, when the tube is in the larynx it naturally tilts a little upward, so that unless the obturator has a joint it is liable to bend on the way out. In direct intubation under cocaine, often only the posterior half of the larynx is seen, so that it is necessary to point the end of the tube slightly upward, which is easily accomplished because the tube can be tilted to any angle by spreading the handles of the forceps. In the indirect method, it is better

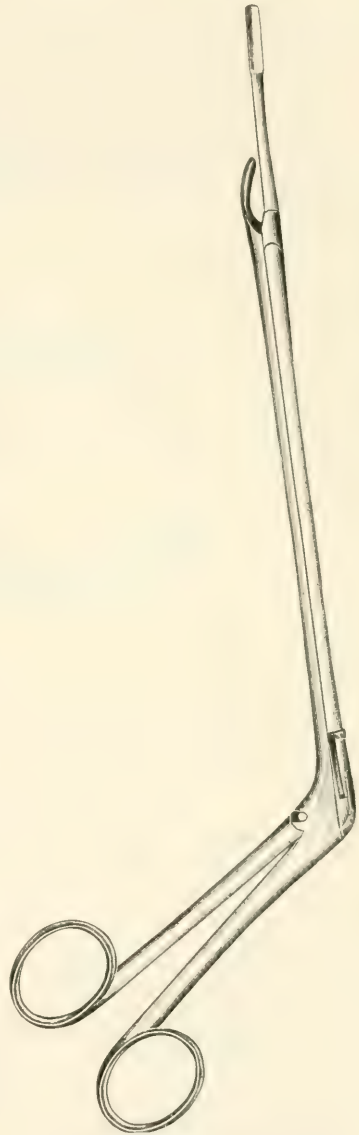


FIG. 11.—Forceps for direct intubation. Forceps shown with the extractor in place.

¹ Laryngoscope, September, 1910.

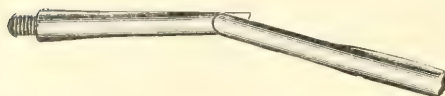


FIG. 12.—Shows the joint in the obturator which allows it to be withdrawn without binding.



FIG. 13.—Shows the manner in which the forceps hold the intubation tube.

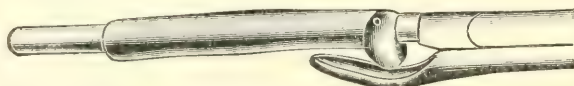


FIG. 14.—Shows a small tube in the forceps. In order to reduce the number of obturators, with the smallest tubes, the obturator is allowed to project beyond the tube.

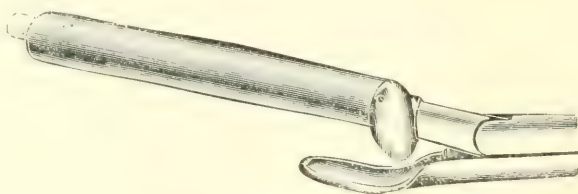


FIG. 15.—Shows how the tube can be raised to facilitate its introduction.

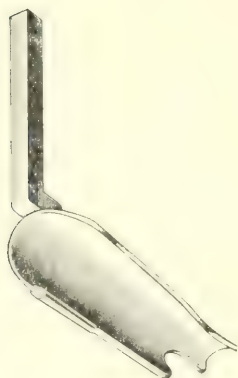


FIG. 16.—Moshier's open speculum.



FIG. 17.—Shows manner of using the open speculum. The edge of the speculum rests on the toothplate.

to thread the tube, for it is perfectly possible to intubate the esophagus. It is not necessary to use the three special obturators except in cases in which there is danger of the tube becoming blocked during introduction.

With small tubes, intubation and extubation can be performed through the Jackson speculum. Extraction can always be done through this instrument, if the tube and speculum are withdrawn together.

When large tubes are to be inserted Mosher's open speculum is essential. He employs it in all cases. These are made in three sizes, two for children and one adult. The direct intubation set consists of the tooth plate, the open speculum, and the intubation forceps with three obturators and one extractor.

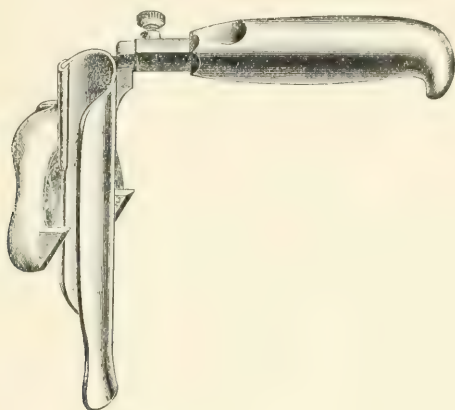


FIG. 18.—Shows the method of using the open speculum. The manner in which this speculum gets its leverage on the tooth plate is shown. The caps on the tooth plate act as a gag to keep the teeth apart.

The Vocal Cords in Goitre. Matthews¹ gives the results of his observations of the vocal cords in 1000 cases of goitre, examined both before and after operation. He found 17 with parietic affections of both cords, 93 of the right cord and 162 of the left, making a total of 289 partial or complete paralyses in 272 individuals. Total paralysis of the right cord occurred 18 times; of the left, 30 times. Partial or complete abductor paralysis of the right occurred 50 times; of the left, 83 times. Partial loss of both motions of the right occurred 38 times; of the left, 62 times. Bilateral tensor paralysis occurred in 4 cases.

In classifying the cases as to the size of the right, median, and left lobes, a division was made for each one-half inch in diameter. It was found that parietic conditions of the right cord increased from 5.3 per cent. in 226 cases with small or non-palpable right lobes, to 25 per cent. in 8 cases with lobes over 5 inches in diameter. Abductor para-

¹ Journal of the American Medical Association, September 3, 1910.

lysis, and partial paralysis of both movements increased more rapidly in goitres ranging up to $3\frac{1}{2}$ inches in diameter, and then gave place to a relatively greater increase of total paralysis. The left cord showed 10 per cent. of paresis in the goitres with small left lobes, increasing to 47 per cent. with those over 5 inches in diameter. There was a still greater tendency for all affected cords to become totally paralyzed as the lobes became larger. This occurred in 5 of 15 cases. Even great enlargement of the median lobe alone was seldom associated with affections of the cords. Total paralysis occurred in but 2 such cases, bilateral tensor paralysis in 4, and minor affections in 9. In nearly every division, except that of the largest lobes, abductor paralysis, either partial or complete, was the lesion most frequently seen.

Although the average frequency of symptoms of pressure on the nerves was directly proportional to the size of the lobes, there were exceptions. For example, paralysis occurred when the corresponding lobe was not palpable. On the contrary, in some cases which had the most tremendous enlargement of the lobes, displacing and distorting the larynx and the trachea, there was no apparent effect on the movements of the cords.

The position of the lobes is quite as important as the size of the goitre, since, for goitres of the same size, affections of the cords are much more frequent in those cases with lobes located near the clavicle, especially if all or a portion of the goitre is intrathoracic. Exceptions to this are the cases in which the large lobes extend so high as to reach the external branch of the superior laryngeal nerve. This condition occurred in 4 cases which showed bilateral tensor paralysis caused by large, high median lobes. Firmness is likewise important, since small, hard lobes are more apt to injure the nerves than larger soft lobes.

Long duration of the goitre increases liability to vocal paralysis, probably because, as a rule, the older cases have the greater enlargement. Apparently there is also an additional danger from long-continued pressure. Men are about three times as liable as women to paralysis from goitres of the same type. Exophthalmic goitre does not materially differ from other forms in its effects on the vocal cords, except in cases of extreme hyperthyroidism, in which its effects are evidently increased as a direct result of general wasting of muscular tissue. The age of the patient has no demonstrable relation to the pressure on the recurrent laryngeal, except that goitres of large size and long duration are more frequently found in older individuals.

In 5 cases, the partial paralysis observed before operation had disappeared after operation, showing that the pressure must have been of short duration and not sufficient to cause permanent degeneration of the nerve. In 8 cases in which the partial paralysis followed operation, probably due to pressure of edematous tissue in the region operated on, later observations showed complete recovery. Twenty-two cases of

partial paralysis following operation were observed but once, so that the ultimate result was not ascertained. In several cases with disturbance of phonation after operation, positive diagnosis could not be made between paralysis and edema.

Twelve cases of total paralysis followed extirpation of the lobes; 3 of these were malignant. Two cases followed ligation of the thyroid artery. In 4 of these cases aphonia appeared two or three days after operation, indicating that the cause was pressure and not section of the nerves. No patient with total paralysis, observed either before or after operation, was seen to have recovered, though, through lack of opportunity for reëxamination after the lapse of considerable time, such recovery might have escaped notice.

The frequency of paretic conditions, often without change of voice or other symptoms, emphasizes the necessity for careful laryngoscopic examination of all cases before operation. This is important, since it is essential to the prognosis of postoperative lesions and might be especially valuable in some cases, as showing the possibility of repairing damage by suturing the nerve severed during operation. Moreover, a beginning paralysis of the laryngeal muscles, apparently due to the pressure of the goitre, would be an indication for early operation in order to prevent complete and permanent degeneration of the nerve.

Vincent's Angina of Larynx and Trachea. While Vincent's angina is a disease that usually affects the pharynx, and especially the tonsils, it has been shown, by a number of cases recorded during the year, that it may sometimes attack the larynx, trachea, and bronchi, without involvement of the pharynx or tonsils.

Arrowsmith¹ reports 2 cases in which the lesion was limited to the larynx. In the first case, the patient had suffered for one week from deep-seated discomfort in the throat, gradually increasing hoarseness and dyspnea, with slight swelling of the neck externally. Laryngoscopy showed edematous swelling of the epiglottis, arytenoids, and ventricular bands. The dyspnea became so urgent that tracheotomy was performed, which entirely relieved the laryngeal symptoms. The tube was removed on the fourth day, the tracheal wound was completely healed by the third week, and the patient was discharged. He returned in a short time with recurrence of hoarseness, dyspnea, and swelling of the soft tissues of the neck. The skin incision had reopened and was discharging foul-smelling pus, which had collected in the peritracheal soft parts and could be pressed out in considerable quantity. Several small abscesses were incised and quite an amount of pus liberated. No communication with the interior of the trachea could be discovered. The pus from these suppurating tracts contained large numbers of fusiform bacilli and spirilla of Vincent. Dyspnea

¹ *Annals of Otology, Rhinology, and Laryngology*, September, 1910.

again became so urgent that a second tracheotomy was done, and smears from the interior of the trachea showed almost a pure culture of the specific germs, as did also the sputum. As the symptoms showed no amelioration, and as no air passed through the larynx when the tracheotomy tube was closed, a thyrotomy was done and a Jackson's laryngostomy tube inserted for the purpose of keeping the larynx open for topical applications and with the hope of averting deforming cicatrization. When the larynx was opened, a mass of friable, cheesy exudate was removed, which was filled with the specific germs. Beneath this exudate the mucous membrane was eroded and bled easily, and in spots the bare cartilage could be felt. The patient received thorough antisymphilitic medication without benefit, and the Wassermann test was negative. During Arrowsmith's absence from the case the laryngostomy tube was removed and the ordinary tracheotomy tube reinserted. When he again saw him the thyrotomy wound had healed down to the tracheal opening. At this time the patient developed symptoms of uremia, with an excessive amount of albumin and casts of all descriptions in the urine. The fusiform bacilli and spirilla eventually disappeared from the sputum, and secretions and cicatricial contraction produced marked stenosis of the larynx, and the patient is unable to breathe at all adequately through the larynx with the tracheal tube closed, but can phonate in very raucous and inharmonious tones. Attempts to dilate the larynx with Schroetter's tubes were unsuccessful.

The second case was interesting from the fact that the infection with Vincent's organisms was superimposed upon a preëxisting laryngeal tuberculosis, a condition hitherto unrecorded. In neither case was there any involvement of the pharynx or tonsils.

In Rothwell's¹ cases the bronchial infection followed pneumonia, the patients suffering from oppression of the chest and smothering sensations, the breathing and cough resembling those of asthma and croup, and a bloody sputum which was filled with the fusiform bacilli and spirilli of Vincent. No pharyngeal or tonsillar involvement was present.

Intralaryngeal Actinomycosis. A very interesting case is reported by Arrowsmith,² in which the lesion was apparently primary in the larynx. The patient, a male, aged nineteen years, a shoe stainer by occupation, at home had lived on a farm and worked among horses and cattle. His family history was entirely negative, as was also his previous personal history. He first noticed a slight hoarseness, which gradually increased until he could speak only in a whisper; it was for this symptom alone that he sought relief. There was at times a slight "stinging" in the throat, which had never been more than disagreeable.

¹ Journal of the American Medical Association, June 4, 1910.

² Laryngoscope, October, 1910.

There had been a slight cough and some dyspnea on exertion. His only antecedent nose and throat symptoms had been an 'occasional trifling epistaxis from the right nostril. Examination of the thorax was negative; the sputum was negative, and the urine showed no deviation from the normal; temperature was normal; weight was 119 pounds; general appearance was good. The nose, pharynx, and tonsils were absolutely normal, and the teeth were in excellent condition and well cared for. The epiglottis was slightly thickened, and to the right of the median line, on the laryngeal surface, there was a small whitish deposit. In the region of both true cords and completely covering and concealing them, were irregular masses of dirty white tissue, more than half occluding the chink of the glottis. The same sort of tissue lined the trachea as far down as Arrowsmith could see, which was but a short distance, by reason of the encroachment on its lumen by this adventitious material. The man was given vigorous antisiphilitic treatment for a month, without improvement. After he had been under observation for about three months, several portions of the laryngeal mass were removed and examined microscopically. The diagnosis of actinomycosis was then made. The patient was put on increasing doses of potassium iodide without apparent improvement, although there soon was no evidence of actinomycosis in the sputum. There were present occasional tubercle bacilli, streptococci, and groups of staphylococci. The condition gradually became worse. Physical signs of consolidation were discoverable in the right upper lobe. There was some cough, emaciation, irregularity of temperature, anorexia, and digestive derangement. At the last examination there was an area in the vault of the pharynx which presented an appearance identical with that in the larynx; previously there had been absolutely no lesion discoverable elsewhere than within the larynx. The physical signs then present were the classical ones of early pulmonary tuberculosis.

Course of Laryngeal Tuberculosis with Artificially Induced Pneumothorax. Da Gradi¹ reports, from Forlanini's clinic, at Pavia, three cases of pulmonary tuberculosis in which pneumothorax treatment was applied, and the associated laryngeal lesions healed completely under its influence. He emphasizes the fact that laryngeal tuberculosis should not be regarded as a local process, because it is maintained constantly by the passage of sputum from lesions lower down. If the latter are cured, the laryngeal lesions are liable to subside of themselves. In the reported cases this occurred under the simplest local measures, or without them in one case, as the infectious focus below practically healed.

Treatment of Dysphagia of Laryngeal Tuberculosis by Injections of Alcohol into Superior Laryngeal Nerve. The local injection of alcohol

¹ Deutsche med. Wochens., June 2, 1910.

for the relief of intractable neuralgia of the various branches of the fifth nerve, originated by Schlösser, is now a well-established means of treatment. For the application of this method to the dysphagia of laryngeal tuberculosis we are indebted to Rudolph Hoffman, of Munich.

Dundas Grant¹ has employed this treatment in a series of cases with most satisfactory results. The duration of the relief is the striking feature of this method of treatment. The solution employed consists of 2 grains of hydrochloride of eucaine B in an ounce of 80 per cent. alcohol. The method of injection is as follows: The patient is placed in the horizontal position, and with the thumb of the left hand the sound side of the larynx is pressed toward the middle line so that the affected half projects distinctly; the other fingers of the hand lie on this. The index finger enters the space between the thyroid cartilage and the hyoid bone from without until the patient announces that a painful spot has been reached. The nail of the index finger is now placed upon the skin in such a way that the point of entrance for the needle lies opposite its middle. The needle is pushed in for about 1.5 cm.; this distance is marked off on the needle perpendicular to the surface of the body. According to the thinness of the subcutaneous layer of fat, the perforation has to be more or less deep. The needle is then carefully moved so as to seek a spot at which the patient feels pain in the ear. The syringe, filled with the alcohol, warmed to a temperature of 45° C. (113° F.) is screwed to the needle and the piston slowly pressed down. The patient now feels pain in the ear, the passing off of which he indicates by raising his hand. During the operation swallowing and speaking must be avoided. The injection is kept up until no further pain occurs in the ear; then the needle is removed and collodion applied. The point of the needle is bevelled much more obtusely than the ordinary hypodermic needle, to avoid the danger of puncturing a vessel.

Roth² also highly recommends this form of treatment and considers it a simple procedure, devoid of danger, which is a valuable aid and should not remain untried when other means employed to control the dysphagia have failed.

Corpectomy for Bilateral Abductor Paralysis. According to Gileitsmann,³ the unsatisfactory results reported by those who have had experience with this operation are to be attributed to the removal of the cords not being sufficiently radical. He claims that, to his knowledge, a complete and radical excision of the cords had not previously been undertaken. Partial excision has proved insufficient to establish a permanent breathing space, and was soon followed either by cicatricial contraction

¹ Lancet, June 25, 1910.

² Münchener med. Wochensh., October 8, 1910.

³ Laryngoscope, April, 1910.

and adhesion, or by formation of a fold; or by regeneration of the cord; on the latter B. Fränkel mainly bases his disapproval of the operation.

There is only one condition in which cordectomy proper, or excision of the vocal cords without removal of any other part of the larynx, can be considered, and this is bilateral paralysis of the abductor muscles of such a character that a return to a normal or sufficiently normal position of the cords, to allow the respiration to go on through the larynx, cannot be expected. A number of lesions, in which bilateral abductor paralysis sometimes takes place, of which may be mentioned syphilis, pregnancy, those of toxic, infectious origin, either furnish no indication at all, or only when, after a lengthy observation, the paralysis has become permanent and incurable.

In Gleitsmann's case, that of a young man, aged sixteen years, with bilateral abductor paralysis, probably of bulbar origin, thyrotomy was performed and the cords completely removed with cutting forceps, special attention being devoted to the anterior commissure and the posterior ends, a portion of the vocal process being removed on each side. Healing was rapid, and the patient after a short time obtained a fairly good voice, due to the function of the cords being taken over by the ventricular bands. This satisfactory condition, however, persisted for only three weeks, after which time the respiratory difficulty began to return. This was found to be due to the development of granulation tissue at the site of the excised cords. The tissue was removed intralaryngeally by excision and curetting, and the air passage made free. The reaction from this operation passed off in two days, and the patient remained well until the end of the week, when he died after a few hours' illness from septic pneumonia. Gleitsmann suggests that in order to avoid the danger of the intralaryngeal removal of granulations, which proved fatal in this case, it might be preferable to leave the thyrotomy wound open until complete healing has taken place.

Transverse Tracheotomy. A transverse incision for tracheotomy is advocated by Franek¹ in an illustrated report of several cases done in this manner. He claims that it has a number of advantages over the longitudinal incision—namely, the wound gapes spontaneously after the transverse incision, immediate healing is more perfect, and the scar blends into the folds of the skin of the neck.

Faradic Current in Aphonia. Hernaman-Johnson² states that textbook accounts of chronic laryngitis, and its accompanying disturbance of voice, err in regarding the disease as if it were identified with a tracheitis. In other words, attention is concentrated on the mucous membrane through the neglect of other equally important structures. The larynx is primarily a mechanical device for the production of vocal

¹ Münchener med. Wochensch., February 8, 1910.

² Lancet, London, November 5, 1910.

sounds, and depends for its proper functioning even more upon the integrity of its muscles and nerves than upon the healthiness of their covering. In chronic catarrh of this organ, the muscles become secondarily affected, and the delicate terminals of the motor nerves in all probability undergo an inflammatory degeneration. An actually inflamed mucosa doubtless demands local sedative application; and even when the trouble has become chronic, astringent sprays, painting, etc., can often play an important part. But the tendency in many chronic cases is for the mucous engorgement to disappear to a great extent, whereas the damage to the neuromuscular apparatus remains. Under such circumstances, it is unreasonable to expect to cure by ordinary means. On the other hand, improvement may be looked for from such measures of "natural therapy" as produce benefit in similar pathological conditions elsewhere, *e. g.*, in that form of facial palsy which is the result of exposure to cold. In treating paresis of the laryngeal muscles by faradization, we are at a disadvantage as compared with the same conditions occurring in an arm or leg. We cannot single out the affected muscle or muscles for individual stimulation. This difficulty is not, however, insurmountable. The secret of success lies in the regular and persistent use of mild currents, which are not calculated to produce violent contraction of opposing healthy muscles. If carefully applied for a prolonged period, this form of electricity exercises a selective action on the affected structures and eventually restores their tone. Remarkable as are the results of faradism in suitable cases, we must not fall into the error of regarding it as a panacea for each and every form of catarrhal aphonia. Where the laryngoscope shows marked swelling and congestion of the cords, the mucous membrane must be attacked vigorously on orthodox lines, and here again we are likely to meet with little success if the nasopharynx is in an unhealthy condition. Nevertheless, even when the mucosa is the part most at fault, the judicious use of the interrupted current forms a valuable adjunct to routine treatment.

Treatment of Hysterical Aphonia. The experiences of Senator¹ with Seifert's method of treating hysterical aphonia have not shown the favorable results reported by Seifert, although he has found it successful in a number of cases in which no benefit could be derived from other forms of treatment. The patient's head is bent as far back as possible, or the entire upper portion of the body is tilted backward. In this position the patients are able to speak or intone. Seifert found that he was unable to speak in a whispering tone when his head was bent backward in this way. The upper part of the body must be completely relaxed. In two cases of Senator's in which this method failed, the aphonia was promptly cured by other measures in the first, and in the other a thickening from chronic laryngitis may have been respon-

¹ Berliner klin. Wochens., July 18, 1910.

sible for the failure. He is inclined to explain the success of the measure in general as due to its moral influence, adding another weapon to the armamentarium at our disposal for effectually influencing hysterical aphonia.

Relation of Stuttering to Amusia. McCready¹ claims that the defective use of the muscles of inspiration, expiration, and of the lips, tongue, and throat, resulting in stuttering, is the "result of imperfect coördination, caused by disconnected and erratic discharges from the cortex." That this incoördination is between the nervous mechanism controlling the acts of vocalization and articulation and the centres having for their function the appreciation and expression of melody and harmony, and is due to a biological variation in such a centre of its commissures. That the cure of stuttering is only accomplished by a process of compensation brought about by the education of cells previously non-functionating, and by forcing the opposite hemisphere to supply a centre similar to that which is imperfectly developed. To this end the reversal of dexterity would seem to be a reasonable procedure.

¹ Journal of the American Medical Association, July 16, 1910.

OTOLOGY

By ARTHUR B. DUEL, M.D.

LOOKING back on the rapid strides by which otology has advanced in the last two decades from a somewhat obscure position to one of considerable importance, one views with pardonable pride its numerous achievements. The improved knowledge of suppurative otitis and its complications, leading to the difficult surgery of the temporal bone and its surroundings, has largely developed within this time. The modern mastoid operation; the radical operation; the invasion of the cranial sinuses and excision of the jugular vein for purulent thrombosis; successful surgery of intracranial abscesses, and suppurative meningitis of otitic origin; surgery of the labyrinth; have each marked some bright spot in the aural field within the last twenty years.

Within this period knowledge and skill, which were at first confined to a few, have passed on to many; so that throughout the country expert aid is now available which formerly could be found only in a few large centres.

Despite all these brilliant surgical achievements, however, one cannot escape from the feeling that there is another side to otology, and that the broad-minded aural surgeon should pause occasionally from his laurels in the operative field to give attention among other matters to the great social and economic problem presented by the so-called "deaf mute."

Deaf Mutism. Clearly, deaf mutism is a question in which physicians should be deeply interested, since it affects such a large number in every community, in whom happiness or unhappiness, usefulness or uselessness, depends upon correction of, or compensation for, a defect with which their practice is directly concerned. And yet comparatively few otologists have given the matter much attention until quite recently leaving the solution of it to pedagogues and others less competent. This indifference has been largely due to ignorance of the great possibilities for improvement in the methods of teaching the deaf child.

It is significant that the profession has awakened to its responsibility—or perhaps it would be more generous to say, to its opportunity—in this great economic and social problem, to see a whole session devoted to a symposium, "The Deaf Child," as was done at the sixteenth annual meeting of the American Laryngological, Rhinological, and Otological Society, held in Washington, D. C., April 29, 1910.

The symposium was opened by Dr. James Kerr Love, of Glasgow, Scotland, who has given close study to the subject for many years. Love read a scholarly paper entitled "The Deaf Child, from the View-point of the Physician and of the Teacher."¹

The paper, in addition to its great interest from an historical point of view, is of great practical value coming from one who has devoted so much energy toward the improvement of methods of educating the deaf child.

In the historical part of his paper he calls attention to the scarcity of medical men among those interested in the deaf mute during the past three hundred years. He divides these years into two almost equal periods of one hundred and fifty years; "the first, or sporadic period, beginning with Bonet, toward the end of the sixteenth century; the second, or systematic period, beginning with de l'Épée, about the year 1760, and extending to our own time." He believes that we have now entered upon a third period, which he calls "the clinical period," during which medical men and teachers "will coöperate to produce results beneficial to the deaf child in a degree hitherto undreamt of."

Until recently, the deaf child has been neglected by medical men because they have not looked upon these unfortunates as patients; and it is due to the awakening of the medical profession to this idea that present reforms have been instituted.

During the "sporadic period" the work was chiefly oral, the preference for that method being based upon the fortunate fallacy, as Love says, "that without speech there could be no thought." Had it not been for this fallacy there would have been very little chance of any teaching at all for the deaf, and as it was, it resulted in teaching for the "deaf rich" only.

During the "systematic period" few medical men interested themselves in the educational side of the question. Dr. Graser, of Bavaria, introduced the practice of making the education of the deaf a part of the public school system, giving the afflicted ones a year and a half or two years of special training before entering them into the regular schools for the hearing.

This plan failed, as Love says, "as even with our better organized school system it would, I think, still fail."

With this exception, no medical man gave the subject any attention until 1880, when Hartmann, of Berlin, wrote his famous work on deaf mutism, by far the ablest medical work on the subject which has ever appeared. "Hartmann's book is full of insight, not only regarding the morbid anatomy of deaf mutism, but regarding the living deaf-mute child and his educational problems, and has not received the attention it deserves, either from medical men or teachers of the deaf."

¹ The Laryngoscope, June, 1910, vol. xx, No. 6.

Love deplores the fact that the attitude of the doctor toward the deaf-mute child has generally been that he was not a patient, but would make an interesting pathological specimen; that they could do nothing for him while living, but would be interested in studying his temporal bone after death.

Mygind, of Copenhagen, for instance, has a work on the deaf mute which is of great value from its treatise on the morbid anatomy, but which devotes only a single page to the education of the deaf.

In like manner, the literature of otological journals on this subject refers in most instances to postmortem findings, rather than to the clinical features of the case.

While the study of the pathology of this condition may be most interesting and valuable as a matter of scientific research, it can never be of use as a matter of education of the deaf, as Love maintains, for the very good reason that the mutism is the result of the deafness, and the deafness is a finished process, from destruction of the cochlear elements. Again, the most accurate knowledge of the method of the destruction of the hearing can be of no value in restoring or preventing it, since it is due in the majority of cases to a systemic cause, and the havoc wrought in the cochlear elements is a "by-product" of the general disease. The prevention of the general disease, not the study of its by-product, can be of service for future generations.

"The disease has long ago destroyed the elements of the cochlea, and we shall never be able to replace them. This is true of measles, scarlet fever, and meningitis (by far the commonest cause of acquired deafness), and it is true of syphilis, perhaps the commonest cause of congenital deafness."

Even the scientific value of the pathological findings is often greatly depreciated by lack of clinical data in a given case.

Speaking of the interesting work of Bezold in mapping out islands of hearing in a large series of deaf mutes, he says: "Bezold was the most careful clinical investigator I have ever seen at work, and if I could get the temporal bones of these thirty deaf children and examine them, and then place the pathological findings alongside the clinical chart, I might be able to throw some light on the physiology of hearing and the pathology of deafness, *though I could hardly help the deaf child*. But as these deaf mutes are all young healthy children, and likely to outlive me, what chance have I of completing my picture?"

During the "systematic period," while the medical profession was doing so little, the teachers elaborated two opposing methods the manual-alphabet method and the oral method and then raised them to perfection so far as was humanly possible. Love's description of these methods and the reasons for their pursuit by their different advocates is most illuminating and instructive. I regret that there is not sufficient space for a résumé of the subject, but it is much better read

in its entirety by those interested. He shows how, throughout the different countries, the poor deaf mutes were inevitably crowded together in large institutions, and, regardless of their mentality or the grade of their defective hearing, all given the same instruction by whatever method was adopted at that institution.

As a result of this plan, all these unfortunates were compelled to leave home and to associate constantly with those who were similarly afflicted.

Furthermore, the plan of instruction massed together all types of defectives; the institution became the dumping-ground for all who could not be taught in the ordinary school with the hearing children.

A class of twelve then might be made up as follows: "One or two are semideaf or very hard of hearing—that is, they speak because of the remaining hearing they have; one or two are semimute children who speak because of the speech they have not forgotten, and which they acquired during the early hearing years of their lives; one or two are mentally defective deaf children; and there are half a dozen ordinary deaf-mute children."

In certain large institutions the impracticability of any satisfactory work with such impossible classification has been recognized; but these are at present the exception, and Love pleads for a general recognition and separating, after careful examination by a competent aurist, into semideaf and semimute; the deaf-mute and weak-minded children.

He cites a number of institutions and their attempts to bring about such classifications. One striking example, showing the great necessity of careful clinical examination by a competent aurist, was furnished by Dr. McLeod Yearsly, aurist to the London County Council Schools. In a letter to Love on the subject, he says:

"Since January 18, 1910, I have once a week attended the head office, examining children sent up to me as deaf. The results are as follows:

Fit for ordinary schools	87
Fit for ordinary schools, front row	43
Hard of hearing	34
Deaf school	36
Mentally defective	8
Total number examined	208"

Here, out of 208 examined, all sent up to the specialist as deaf children, "only a bare majority had any considerable deafness at all."

Having discussed the question of segregation of different types in institutions, Love reverts to another phase of the question, as to whether these defective children should be sent to an institution at all. He is most positive and convincing in his conclusions that the semideaf and semimute should not associate with the deaf and dumb at all. For

the mentally defective deaf child he is equally positive that he should be taken away from home and kept in an institution for life, for two very good reasons: "(1) He will never be self-supporting. (2) If you let him out, he will beget other mentally defective children."

The question is thus narrowed down to whether the ordinary deaf mute—"the child who is so deaf that he is also dumb"—shall be removed from his home and compelled, on account of his defect, to associate constantly with others who are similarly afflicted. And to this question he answers a most positive *NO!* On the contrary, he should, whenever possible, live at home or be boarded in a household near the school, attending a *day school for deaf children*.

This gives him the advantage of associating out of school hours with those who are not deaf, where he can have an opportunity of practising what he has learned with the kind of people with whom he will have to live in after life. This in the best way furnishes the mental stimulus for him to acquire in the classroom all the speech possible for use in the outside world. Quoting Hartmann, he says:

"It must be said that the influence of parental love upon the mind, the morals, and the character of the child living at home is a boon for which no substitute can be found in an institution. In this respect, all children, deaf mutes as well as others, are situated alike, and I consider the influence of the family life upon the child of such importance that for this reason alone I would prefer a good school to which deaf-mute children, living at home, may be sent, to a large institution in which the children reside and are trained by their teachers."

Constant intercourse with the outside world is a necessary part of a deaf mute's education if he is to be kept from a segregated class, and this is most essential during the years when he is being educated. So that deafness, the very reason which has brought about the institution for his training, should really be looked upon as a good reason for not placing him in an institution at all.

Following out his division of the subject into the sporadic, systematic, and clinical periods, Love says that we have now entered the third or clinical period, in which *classification of deaf children on a clinical basis* will be the great feature. The movement is being urged on by the recognition of the importance of the question by the government and the inauguration of two great legislative enactments—"the free and compulsory education of deaf children, and the medical inspection of school children."

The period will also see a great change in the method of teaching. Oralism will be both limited and extended. "When oralism is taught at all it will be taught thoroughly and unmixed." The day school system will be extended; most deaf children will be restored to family life, and a larger number of the deaf than heretofore will be removed

from the smaller world of the deaf and dumb, and placed in the greater world of the hearing, as capable and helpful citizens.

Love was against undue haste in making the changes which are necessary, in order that grave mistakes may be avoided. The most likely mistake would be that children, after a certain preliminary education in the right way, would be taken from the special schools and placed in classes with hearing children, where the instruction would be given by incompetent teachers. The important thing is to see that the child has full tuition for a period of ten or twelve years, always under the guidance of a specially trained teacher. The classes should be so small that each pupil might receive a great deal of individual attention. Under such careful management the day school for the deaf would be an assured success, and the cost would be much less than under the present system of institutions.

Another point to be kept in mind in the education of the deaf child is that the instruction should be begun in earliest infancy, long before the child can be sent to the day school. This preliminary instruction must necessarily be given by the infant's mother, and in order that this may be in any way satisfactory it is important that the mother should be instructed how to give it.

The National Association of the Teachers of the Deaf in Great Britain has issued a circular for the parents and guardians of the deaf, in which the method of creating or perpetuating the speech habit is pointed out. This is very difficult, and Love suggests that the mothers should be invited to visit the proposed day schools, where they might see the methods carried out by competent teachers, and thus learn to go about this preliminary training of their infants before they were old enough to attend the school. The oral method, to be a pronounced success, should be begun long before the age of five years, which is the earliest that is practicable in schools. It therefore devolves upon the mothers, and they are very incompetent, without some instruction, to take up this difficult work with their defective children.

I regret that space will hardly permit of a more exhaustive résumé of this classical paper on a subject which should command the attention of the entire profession.

The paper is summed up with these propositions: "(1) The education of deaf children without previous clinical examination and classification is wasteful and inefficient. (2) The massing of deaf children in institutions should be avoided, except in the case of the mentally defective deaf. Necessitous deaf children should be fed, clad, and, when necessary, boarded out at the expense of the educational authorities. In these respects they need the same treatment as necessitous hearing children. (3) The education, but not the instruction, of deaf children should be begun as soon as the fact of deafness is known, and the mothers

should be the first teachers. Unless the speech habit be acquired before the age of five years, the best oral results can seldom be got."

The point regarding clinical examination and classification is again emphasized. Coöperation between the physician and teacher can only be brought about by medical inspection of all school children, and, in addition, an aural specialist must be a constant attendant on all schools for the education of the deaf.

Even the aural surgeon must be a constant student of this class of defectives for a long time before he can "understand these strange creatures, without hearing, without speech; this half animal, half god (who by education may be made a man), with no evidence of that which stamps man, more than anything, as higher than the lower animals—the power to receive and communicate thoughts. But as year after year he sees further into the patient, waiting spirit, and as year after year he sees this spirit set free, he will be rewarded by the highest that is given to our profession—love; not mere pity, but an intelligent and helpful love for these little ones who cannot help themselves. Thus will the physician share a privilege which has been too long that of the teacher of the deaf."

Eight other papers relative to the different aspects of the subject, and all of the deepest interest, followed Love's¹ classical opening paper.

Great enthusiasm over this important subject was awakened. A committee was named for the purpose of increasing interest in the subject throughout the country by endeavoring to have at least one lecture each year delivered before the graduating class in every medical school. A better knowledge of the needs of deaf children disseminated in this way cannot fail to broaden the profession tremendously, and will in time lead to great improvements.

Otitic Meningitis. A symposium on this subject was read at the Otological Section of the American Medical Association, the symptomatology and diagnosis by Dench,² the indication for surgical interference by S. MacCuen Smith,³ the operative treatment by Holger Mygind,⁴ of Copenhagen, Denmark.

While the subject was presented in a very attractive and instructive way, little that was new can be said to have been added. The important points to be kept in mind were the early recognition of the condition, by symptoms which are well known (but none of which are absolutely diagnostic), and the early operative interference in all cases. Even the apparently hopeless cases have sometimes recovered, and with this knowledge it requires more courage not to operate than to operate.

Although all of the first 10 of Mygind's cases died after operation, 6 of the next 23 completely recovered. In all of these cases the diag-

¹ The Laryngoscope, June, 1910, vol. xx, No. 6.

² Journal of the American Medical Association, vol. lv, No. 9.

³ Ibid.

⁴ Ibid.

nosis was confirmed by the presence of a turbid spinal fluid upon lumbar puncture. This was taken by Mygind as the diagnostic symptom. He says, in regard to this particular point:

"It is well known that the diagnosis of otitic meningitis is extremely difficult in many cases, and if it were not for lumbar puncture many more diagnostic failures would be made than at present. Like most other diagnostic methods, it is not infallible, but the exceptions are very rare. Its principal drawback is that cerebrospinal fluid is not always evacuated, or it is united with blood, which renders the examination worthless. I have made use of lumbar puncture over 200 times, and consider it, if all proper aseptic precautions are taken, a safe procedure; only once or twice was it followed by unpleasant consequences in the form of pains in the back and in the legs, which pains, however, were only of short duration. The more I use the lumbar puncture, the more I rely upon it as a diagnostic method.

"My experience in the use of lumbar puncture shows that, in all cases of otitic meningitis, the cerebrospinal fluid is turbid twenty-four to thirty-six hours after the onset of the meningitis, but rarely earlier than twenty-four hours after the onset; it contains cells, of which the majority are polynuclear. Bacteria are generally present; when they are absent, the prognosis is favorable. The more turbid the fluid, the worse the prognosis. On the other hand, the clearing of the fluid during treatment is a sure sign of the retrogression of the meningitis, and in several of my cases it showed itself before the brain symptoms began to clear up.

"I often perform lumbar puncture without any general anesthetic, but in cases in which I am convinced that the patient has intracranial disease, I often postpone this procedure until the patient is under the anesthetic for the operation. If the microscopic appearance of the fluid leaves any doubt, a microscopic examination is performed by an assistant during the first stage of the operation.

"I have tried repeated lumbar punctures in a few cases as a therapeutic agent in otitic meningitis, but have not observed any beneficial result."

To this belief many have taken exception, maintaining that a turbid spinal fluid is by no means an absolute indication of a purulent meningitis. In this discussion of the symposium, Norval H. Pierce maintained that it was impossible to differentiate clinically between certain forms of serous meningitis and purulent meningitis. In both conditions, fever, pulse, stiff neck, slow cerebration, delirium, and a similar general condition could be found.

"You may get a cloudy fluid very rich in leukocytes on lumbar puncture and yet have a serous meningitis that is due to a localized purulent

¹ Journal of the American Medical Association, vol. lv, p. 759, No. 9.

focus within the epidural space which has been walled off. The corpuscular elements sink to the bottom of the cerebrospinal sac as they would in a test-tube. That we may have a cloudy fluid on lumbar puncture in cases of serous meningitis is abundantly proved by the observations of Koerner, Alexander, Voss and others."¹

Despite this discrepancy in opinion, however, Mygind stoutly held to his position, closing the discussion with these trenchant remarks:

"There is not a single symptom, subjective or objective, which is pathognomonic of meningitis. I have seen fatal cases in which, until death, there was no rigidity of the neck and no Kernig sign, although the sign of Kernig is almost the most certain that we have, but I have seen two cases in which the sign was absent until death, and on the other hand, I have seen cases of hyperemia of the brain in which it was present, though only very slightly. So I think there is not a single certain subjective or objective sign. There is only one certain method of diagnosis, and that is by means of lumbar puncture.

"Another question is: What is serous meningitis, and what is purulent meningitis? Well, I think we shall not waste much time discussing that, because it is merely a matter of words. Let us first agree on what is a serous meningitis. If you go to three different competent men you will hear three different opinions as to what serous meningitis is. If you want my opinion, I will say this: It is an acute disease of the brain, with symptoms, subjective and objective, of meningitis, in which the spinal fluid is clear but containing polynuclear cells when examined under the microscope. That is my definition. To call a case serous meningitis when there is no serous appearance of the fluid is confusing; so I think this definition I have given may help. I will not say it is the right one, because I might come to the next meeting with a different opinion; it is *sub judice*. We are in the first stage of our knowledge and are experimenting. If the fluid is turbid and contains an excess of polynuclear cells, we have evidence of an inflammation of the meninges. Dr. Pierce may say that it is localized. Well, I have seen several cases of localized meningitis, and in not a single one was there any alteration of the cerebrospinal fluid. I will not say that such cases do not occur. As I² said in my paper, the puncture is not invariable, but the exceptions are rare."

Suppurative Labyrinthitis. The meetings of the International Otolological Congress, the National meetings in England, France, and America, and practically all local society meetings, have been characterized by one of several papers on this all-absorbing topic in otology. Nearly all of the papers have been re-arrangements of the work done by the Vienna school, and have detailed the methods of diagnosis and the indication, and manner of operation.

¹ Journal of the American Medical Association, vol. iv, p. 762, No. 9.

² Ibid., p. 763, No. 9.

In several instances, personal experiences, with a limited number of cases, have been given, but viewing the large clinical experiences of Jansen, in Berlin, and Alexander, Neumann, Barany and others, in Vienna, one naturally looks toward them for the latest word in surgery of the labyrinth.

At the meeting of the Section of Laryngology and Otology of the American Medical Association, I had the pleasure of opening the discussion of a symposium on the subject by Hollinger, Fletcher, and Davis.¹ Hollinger, in his paper on the *pathology* and *prognosis*, deplores the fact that the literature is so top-heavy with the clinical side of the question as compared with the pathological, and rightly ventures the opinion that the present views on the indications for operation will be greatly modified as experience grows. He divides the cases for study into the following types:

I. Serous labyrinthitis.

II. Labyrinthitis in connection with acute otitis media, including scarlet fever, diphtheria, and otitis leading to formation of a sequestrum.

III. Chronic labyrinthitis in consequence of cholesteatoma. (a) Circumscribed labyrinthitis. (b) General labyrinthitis, caries, necrosis.

IV. Tuberculous labyrinthitis.

A short description of each type is given. Speaking of the *prognosis* in cases resulting from cholesteatoma, he quotes Dr. Karl Gruenberg as follows:

"Pathology teaches us that the suppurative inflammation of the labyrinth has a pronounced tendency to heal, provided life is not extinguished by other complications. After the acute stage has passed, the exudations become organized and form a scar." Later on he records the following sanguine quotation from Goerke (the *Italics* are my own):

"The number of cases of labyrinthitis which heal in this way cannot be estimated; hardly can they be suspected, if we consider how many ears of deaf mutes show similar changes. It must be repeated over and over again that the most serious forms of labyrinthitis show attempts at recovery, which—and this is important—really give the protection which we expect of them."

In view of such opinions, Hollinger is much surprised at the reported death rate in labyrinthine operations, and attributes the results to "lack of knowledge of pathology, lack of experience on the cadaver, and lack of clinical experience."

The difficulties and dangers of operations in this region necessitate an intimate acquaintance with the anatomy, as well as great skill in technique on the part of both the operator and his assistant.

The present attitude of the Austrian and German schools is best

¹ Journal of the American Medical Association, October 8, 1910, vol. iv, No. 15.

represented by Alexander's¹ classical paper, "The Treatment, Course, and Prognosis of Purulent Disease of the Labyrinth," and the discussion which followed.²

I have tabulated his classification of inflammatory affections of the labyrinth as follows:

Duration . . .	{ Acute, Chronic.	
Nature . . .	{ Serous Purulent Purulent infective	{ Without intracranial complication. With intracranial complication.
Location . . .	{ Paralabyrinthitis Perilabyrinthitis Endolabyrinthitis	{ Circumscribed: (a) Tendency to remain so. (b) Tendency to spread. Diffuse.
Any type . . .	{ With a fistula. Without a fistula.	

OPERATIVE TREATMENT. Whenever operative treatment is indicated, it is imperative that it shall be done thoroughly; while simple opening of the cavities may drain the labyrinth, the more chronic the progress of the case the more probability of necrosis of the bone and implication of the adjacent dura, and consequently the more necessity of removal of the petrous portion of the temporal, preserving, of course, the facial canal and nerve.

The operations on the labyrinth are:

1. Opening of the labyrinth (simple labyrinthotomy).
2. Opening of the labyrinth with subsequent curettage of the labyrinth spaces.
3. Enlargement of preëxisting fistulæ of the labyrinth.
4. More or less complete ablation of the labyrinth (labyrinthectomy; resection of the temporal bone).

Regardless of the method employed, the objects to be obtained are:

1. Opening of all the cavities.
2. Sufficiently large openings for free drainage through the labyrinth walls, behind and in front of the facial canal.
3. Removal of all diseased bone.

4. Inspection of the dura in the region of the petrous, for extradural abscess or pachymeningitis. In the posterior fossa, infection through the endolymphatic duct may have caused an empyema of the saccus endolymphaticus, and extradural abscess, or pachymeningitis. In the middle fossa, an infection through the superior semicircular canal may have caused an extradural abscess or pachymeningitis.

¹ Read at the Otological Section of the International Medical Congress, at Budapest, 1909. Abridged translation by Dan McKenzie. *Journal of Laryngology, Rhinology, and Otology*, vol. xxv, No. 9.

² Otological Section of the International Medical Congress, at Budapest, 1909. *Journal of Laryngology, Rhinology, and Otology*, vol. xxv, No. 9.

Each operation is thus divided into three stages:

1. Opening of the labyrinth.
2. The removal of all diseased bone.
3. Exposure of the dura.

Opening of the labyrinth without resection is only justified in cases where clinical examination has demonstrated beyond a doubt that there is a healthy endocranium and sound petrous bone.

Alexander contends, however, that the usually performed opening of the labyrinth never affords sufficient drainage or opportunity for inspection.

Method of Operating. The improved methods of examination of the function of the labyrinth has practically rendered the so-called exploratory operation unnecessary, and since it is seriously open to criticism as a therapeutic measure, Alexander condemns it altogether. The functional examination, properly carried out, tells us whether or not ablation of the labyrinth is called for, "and warns us when a patient is passing through that peculiar stage of labyrinth suppuration in which any operation, even the simple radical mastoid, is fraught with peril."

The principles involved in the operation are ease of inspection, removal of the purulent focus, and adequate drainage. These involve a combination of openings and resection, as advised by Jansen and Neumann.

Alexander objects to the technique advocated by these men, however, on the ground that they lay down hard and fast rules for each case, without regard to the extent of the involvement. "According to Jansen, we must penetrate into the vestibule; according to Neumann, we must go as far as the internal auditory meatus." Such an extensive removal of bone as the latter operation would necessitate, however, would not be called for unless there was an intracranial complication. Local conditions should be the guide regarding the extent of the operation, as follows:

"1. When the bone is macroscopically healthy and the suppuration manifests the characters of an empyema of the labyrinth, it is sufficient to begin the resection at the vertices of the semicircular canals and to carry it forward in the direction of the vestibule until the clear perilymph and endolymph can escape freely. (Sometimes the fluid spouts from the opened canal like a jet of blood from a wounded vein, and at other times it wells up without any force.)

"The labyrinth in this state may be likened to an inflamed lymphatic vessel or to a suppurating cranial sinus. Surgically speaking, the labyrinth is nothing but a lymphatic vessel of complex anatomical structure enclosed in bone, and in our operative measures we must shut our eyes to the fact that this lymphatic vessel contains a sense organ. We remove as much of the lymphatic as is diseased.

"2. In cases in which the bone (as well as the endolabyrinth) is implicated in the disease (caries or necrosis of the petrous bone, caries of the bony wall of the labyrinth), the osseous labyrinth should be removed as thoroughly as possible—back to the sigmoid sinus, and forward, if necessary, to near the carotid canal, the facial canal being spared unless the nerve is known to be irreparably damaged.

"3. When suppuration of the labyrinth is complicated with intracranial disease in the posterior fossa (cerebellar abscess, extradural abscess, sinus thrombosis), the semicircular canals must be entirely removed and the vestibule opened. And, if the vestibule is found to be full of pus, the internal auditory meatus must also be freely exposed. At the same time, the cochlea must be efficiently drained, and this can be most easily attained by removal of the promontory with the chisel, and by removing the stapes and enlarging the fenestra ovalis downward and forward. If a fistula is visible, the attack on the labyrinth may begin there. If there is no sign of fistula, the author combines ablation of the labyrinth with exposure of the posterior fossa, and the best landmark in setting out to do this is the anterior wall of the sigmoid sinus. The sinus having been exposed, the bone between it and the labyrinth is removed, then the canals are cleared out, and finally, the vestibule and, if need be, the internal auditory meatus are opened up. (Before proceeding to elaborate the indications for operating on the labyrinth, the author pauses to define as follows his views and procedure with regard to exposure of the cranial fossæ.)

"In every case of suppuration of the labyrinth which comes to operation, the dura of the middle and posterior fossæ must always be exposed.

"If previous lumbar puncture has shown the cerebrospinal fluid to be abnormal, the operation is concluded with the incision of the dura of the posterior fossa, and if, in the same circumstances, it is found at the operation on the labyrinth that the disease is extending toward the middle fossa, then it is advisable to incise the dura of the middle fossa as well.

"To open up the labyrinth freely without at the same time laying bare the dura is a highly dangerous proceeding, as it exposes the patient to the imminent peril of postoperative meningitis.

"In recommending a free exposure of the dura we are merely carrying out what is already the practice in cases of otitic extradural abscess or sinus thrombosis; and it is all the more necessary in labyrinth cases because the suppuration of the labyrinth is sometimes complicated with the presence of a masked or latent extradural abscess between the dura and the petrous bone, and to open the labyrinth without at the same time exposing the dura would render liable the extension of such an extradural abscess toward the brain.

"If a fistula leading toward the dura is found at the operation, the direction of our interference is clearly manifest; but if there is no such

fistula, then the region of the saccus endolymphaticus should be inspected, for it is here that labyrinthogenic extradural abscess most commonly develops.

"Once it is exposed, the dura can be excised subsequent to the operation without further narcosis, if the postoperative symptoms call for such a step."¹

Indications for Operation. The very wise premise to this part of the subject is made that it is well to bear in mind at the outset that any operative interference is absolutely contraindicated in hyperacute and chronic latent cases, nothing being attempted further than a very cautious, conservative treatment of the middle-ear disease.

Operation on the labyrinth is called for in *purulent labyrinthitis complicating chronic middle-ear suppuration* under the following conditions:

1. When there is chronic infective peri- and endolabyrinthitis, with symptoms of intracranial complication.
2. When it is evident that the infection has extended to the labyrinth capsule, the petrous bone, or the internal meatus.
3. When a fistula symptom can be elicited in a case of diffuse labyrinthitis.
4. When a cholesteatoma has infected the labyrinth.
5. When there is a chronic circumscribed peri- and endolabyrinthitis, accompanied by a fistula symptom in an ear in which the hearing is greatly impaired, while there is good hearing on the other side.
6. When an intracranial lesion appears in a case of chronic circumscribed labyrinthitis.
7. When continuance of labyrinth symptoms in a case of chronic circumscribed labyrinthitis seems to threaten an extension to the rest of the labyrinth. (Operation is contraindicated in a definitely localized encapsulated chronic suppuration.)

Particular stress is laid on the point that, in any case where a suppurative labyrinthitis is present, the radical and labyrinth operation when begun should invariably be completed at one seance; otherwise, the unavoidable traumatism is more than likely to set up a diffuse meningitis and death.

Operative indications or non-indications in *purulent labyrinthitis* occurring in *acute or subacute suppuration of the middle ear* are classified as follows:

1. Acute paralabyrinthitis, with fistula formation by erosion of external semicircular canal, requires only antrotomy, no labyrinth operation being necessary.
2. Acute purulent panotitis, without intracranial involvement or caries of the petrous, will recover without operation. Complete destruction of hearing.

¹ Journal of Laryngology, Rhinology, and Otology, September, 1910, vol. xxv, No. 9.

3. Acute purulent panotitis, with intracranial involvement, requires immediate operation, with partial resection of the petrous.

4. In acute circumscribed suppuration (progressive or diffuse) operation is deferred until latent stage is reached, when operation, radical and labyrinthectomy, is advised.

Labyrinthitis which has been excited by traumatism during operation is placed in two classes. The first, the type which occasionally develops after a radical operation for no very apparent reason, usually recovers in about a week. The hearing usually recovers, though occasionally it is destroyed.

The acute cases which have been caused by luxation of the stapes or fracture of the labyrinth should be operated upon immediately by free opening and drainage, as such cases are very liable to be fatal.

The acute diffuse fulminating cases which come on in the course of a chronic otitis, without any traumatism, are placed in a class by themselves as regards treatment. Under no circumstances, except the pressure of intracranial symptoms, should such a case be operated during the acute attack. Absolute rest in bed, with conservative treatment of the middle-ear suppuration, is recommended, until subsidence of the labyrinth symptoms has taken place. Many of these cases recover without operation. Even such cases as eventually come to operation should be carefully nursed along to the latent stage before it is attempted.

In tuberculous labyrinthitis operation is not advisable, except after the formation of a sequestrum.

Alexander¹ sums up the operative indications as follows:

"In chronic labyrinthitis secondary to chronic middle-ear suppuration, the indications for operative interference consist solely in the presence of an intracranial complication, an extension of the disease to the bone, the formation of a fistula, or the existence of cholesteatoma of the labyrinth.

"In hyperacute diffuse labyrinthitis supervening upon chronic suppuration of the middle ear, a temporizing conservative line of treatment is advisable.

"In labyrinthitis coming on in the course of an acute otitis media, there is no need to operate on the labyrinth itself (apart from a variety which resembles meningogenic labyrinthitis).

"In labyrinthitis due to operative trauma, immediate operation on the labyrinth is imperative.

"In chronic circumscribed labyrinthitis with a fistula, the labyrinth should be freely opened up, since in any event, without any further extension of the disease, the hearing will be destroyed."

¹ *Journal of Laryngology, Rhinology, and Otology*, September, 1910, vol. xxv, No. 9.

PROGNOSIS AND COURSE. As a general rule, the cases of mild onset and chronic in type are more favorable than those of a virulent type and acute onset.

Acute labyrinth suppuration, secondary to chronic purulent otitis, is most prone to set up a meningitis, and is, therefore, the most unfavorable for the life of the patient.

Chronic suppuration of the labyrinth, uncomplicated, is quite favorable. The circumscribed variety often recovers without loss of function, although the function in such cases may be lost subsequently by degenerative changes.

Certain cases may be very protracted, become encapsulated, and last for months. In such cases, the infectivity of the abscess may disappear altogether.

It is even possible for cholesteatoma of the labyrinth to heal spontaneously.

It is undoubtedly true that the cases of meningitis, secondary to chronic labyrinth disease, are the most favorable forms for cure, when operated by recent methods.

Those cases of meningitis resulting from an acute fulminating labyrinth, secondary to chronic purulent otitis, are very unfavorable.

Tuberculous cases, even if followed by seemingly good results at first, eventually die of tubercular meningitis or encephalitis.

Early operation on labyrinthitis following traumatism at the time of the radical operation, has saved many cases which were formerly lost by conservative methods.

In concluding his paper, Alexander calls attention to the facts that the surgery of the labyrinth cannot be considered trifling, even by the most skilled operator; that the stability and elasticity of the base of the skull is weakened by the extensive removal of bone necessitated by the operation; and that a subsequent transient inflammation in an operated case, such as often occurs in healed radical cavities, may be dangerous to the life of the patient.

Of all the recommendations made at the International Congress, that of Schmiegelow, to expose the facial nerve in order not to wound it during the operation, as recommended by Uffenorde, was most thoroughly criticised, the general view being that this was inadvisable.

There was a general tendency among all to leave acute cases alone, except when pressing evidence of intracranial involvement was present. This did not apply, however, to the acute traumatic cases, in which immediate operation was advised. Jansen, of Berlin, differed in his recommendation for the acute traumatic cases, believing that opening of the vestibule was sufficient, while many others thought a complete labyrinthectomy advisable.

There was a marked diversity of opinion regarding the advisability of operation on the latent forms. I believe, as experience grows, that

there will be less operating on these cases unless symptoms of extension occur.

The need for a careful functional test of all chronic suppurative cases is apparent, however, when it is a recognized fact by all that a case with latent suppurative labyrinthitis should have no operative interference which does not contemplate exenteration of the labyrinth at the time of the radical operation.

The cases in this way lighted up into acute fulminating labyrinthitis, are most likely to extend to the meninges, and thus become fatal.

Eustachian Tube. Probably no communication to otological literature during the past year has been of more importance than that of Sydney Yankauer,¹ entitled "The Isthmus of the Eustachian Tube. A Contribution to the Pathology and Treatment of Middle-ear Disease."

He starts out with the proposition that the Eustachian tube has hitherto been studied anatomically from the wrong viewpoint. The tube has been considered as being made up of two parts—the cartilaginous or pharyngeal portion, and the bony or tympanic portion, the junction of these two forming the narrowest part or isthmus. While this is true, the anatomical and histological differences between these two portions of the tube are so marked that they should be separated in their description, and each really considered as a part of the cavity from which it springs. Thus, the pharyngeal portion of the tube, from all its anatomical and histological characteristics, is essentially a part of the nasopharynx, while, in a like manner, the tympanic portion is a part of the tympanum. He proposes, therefore, to start the description of these structures at the natural dividing line—the isthmus—and consider each portion as a part of the respective cavities toward which they lead from this point. This consideration of the subject necessitates a new conception of the structures, and Yankauer proposes that the tube down to the isthmus be described as a part of the tympanum and be called the *pretympanum*, in contradistinction to the *epitympanum* and *hypotympanum*; while the pharyngeal portion up to the isthmus be described as the tubal part of the nasopharynx. The isthmus thus becomes analogous to the openings from the accessory sinuses of the nose.

From this standpoint, Yankauer proceeds to discuss the importance of the isthmus, "the point at which the middle ear enters the nasopharynx" in its relation to all diseases of the middle ear; both the catarrhal types, and their interference with function; and the suppurative conditions, acute and chronic. He has devised sets of bougies and sounds, accurately graduated and measured for determining the shape, character, and position of constrictions; and a technique for treatment which shows an immense amount of painstaking labor.

¹The Laryngoscope, July, 1910, vol. xx, No. 7.

By means of his methods he has succeeded in improving the ventilation of the tympanum in acute and chronic stenosis of the tubes with such striking results as to command careful consideration. Further studies concerning the importance of the ventilation of the tympanum in the closure of perforations of the tympanum have led him to assert that it is impossible for an opening in the tympanum membrane to heal when the tube is completely stenosed. The importance of this will be seen, on the one hand, in keeping the tube open after acute suppuration, where it is desirable to heal the perforation; and on the other, the importance of producing a permanent stenosis of the tube where one wishes to maintain a permanent opening in the drum membrane, as has been so often attempted, with poor success, in chronic catarrhal otitis media and otosclerosis. He details some brilliant cases of the latter.

Perhaps the most important part of all this work was the reported results in a considerable number of chronic suppurative cases cured by closure of the Eustachian tube at the isthmus, thus preventing constant re-infection of the tympanum.

These successes were in a class of cases in which the radical operation has formerly been deemed necessary for cure. It is a well-known fact that for many years failures in cure of chronic suppuration by radical operation have been frequently attributed to an incomplete closure of the Eustachian tube, and when this has been accomplished healing of the excavation has been quickly completed. Yankauer suggests that in many cases we may have "gotten the cart before the horse;" and that, had the tube been closed off in the first instance, a cure might have been affected by careful treatment afterward, without resort to a radical mastoid operation. He has devised ingenious instruments and a special technique which can be readily carried out, with careful attention to the details, by any skilful aural surgeon. His reported results are brilliant enough to warrant most careful consideration and study by all interested in this work.

Sigmoid Sinus Thrombosis. At a meeting of the Otological Section of the Academy of Medicine, on November 11, 1910, Dr. Seymour Oppenheimer read a paper entitled "Some Remarks on Sinus Thrombosis, with Particular Reference to the Diagnostic Value of Blood Cultures in Otic Disease."

This was a continued report on the work at Mount Sinai Hospital, a review of which was given two years ago in *PROGRESSIVE MEDICINE*, at the time when Gruening read his paper reporting ten cases. Oppenheimer adds a number of cases in which the early diagnosis of sinus thrombosis was made as a result of the demonstration by Libman, the pathologist, of the presence of a bacteriemia.

Reviewing the work of Libman on the subject, he concludes that the presence of a bacteriemia in a case with a suppurating ear is con-

elusive evidence of septic sinus thrombosis, other foci of infection being eliminated, or that a continuing bacteriemia after obliteration of the sigmoid sinus points toward an involvement of the jugular vein.

Both Libman and Oppenheimer, in their discussion of the question, seem to discredit all work done by others which in any way disagrees with their own findings, and which might compel an alteration of their own conclusions.

In view of the fact that other competent observers have repeatedly reported findings of bacteriemia in patients having suppurative otitis or mastoiditis, in whom there was no clinical evidence of septic sinus thrombosis, and in whom recovery took place without operation upon the sinus or jugular vein, it would seem fairer for them to modify their views somewhat, and perhaps avoid the grave error of misleading a great number who had not had an opportunity of reviewing the whole matter. For instance, McKernon mentions six cases in whom the cultures were made by such competent men as Frederick Sondern, and Henry T. Brooks. Wright and I reported nine such findings made in the laboratory of the Manhattan Eye, Ear, and Throat Hospital, the laboratory work all having been done by Miss Guisau, whose great skill and conscientiousness could hardly be questioned. All these positive results are ignored or discredited because they do not coincide with their own findings. Such a position is quite untenable in the minds of those who have taken the trouble to look into the matter.

As a matter of fact, such clear-cut and fixed ideas are rendered most improbable by other investigations of the blood made by painstaking workers both in America and abroad.

It has been pretty well demonstrated that the germs of all infectious diseases may be found floating in the blood current and the lymph current, as well as in many of the tissues of the body. This is also true of all surgical conditions having suppurative foci in the body. This bacteriemia is usually accompanied by clinical signs—alterations in temperature, pulse, and respiration—which measure quite accurately the extent of the infection. A number of cases have been recorded in which bacteria of different kinds have been demonstrated in the blood and tissue of individuals who gave no clinical manifestation of their presence.

It is highly improbable that the presence of bacteria in the blood in suppurative conditions is always the result of a previous formation of a septic venous clot.

On the other hand, it is significant that when sought for, bacteriemia has been demonstrated at some time or other in all cases of sinus thrombosis. Yet, in the undoubted presence of a septic clot an examination by present methods may fail to demonstrate a bacteriemia.

Under such circumstances, it was the generally expressed view of the practical clinical aural surgeons present that *despite the usefulness*

of a demonstrated bacteriemia in certain cases as an aid to diagnosis, the clinical symptoms, with which we are all familiar, will still have to be mainly relied upon as an operative indication; and that, on the one hand, the presence of a bacteriemia without clinical manifestations would not induce us to operate; on the other, the absence of a bacteriemia would not deter us from operating when clinical symptoms pointed strongly toward a septic clot in the sigmoid sinus.

Syphilis. Dr. O. Beck,¹ of Vienna, reported an interesting series of 34 cases, in which he had made the Wassermann test in cases of internal ear disease.

Only such cases were examined as showed no etiological factor of the disease, who denied venereal infection, and whose clinical picture presented a clear "internal ear lesion."

He exempted from this examination all patients who had experienced an acute febrile disease (typhoid, scarlet fever); all in whom there was a suspicion of any intoxication; all who had recovered from a skull trauma; and all whose nervous apparatus might have been affected by their vocation, as boilermakers, blacksmiths, etc. All patients had to show a normal tympanum. Those with changes due to chronic purulent otitis media were rejected, as were cases with marked unilateral disease of the inner ear in whom disturbances of the conducting apparatus could not be positively eliminated. In his cases, Rinne had to be positive in both ears, and Weber had to be lateralized to the best ear. The time of perception of the high tones had to be shortened, as well as air and bone conduction.

Out of 34 cases, 22 were negative, 10 were positive, 1 case gave a "medium strong" reaction, 1 case positive reaction (medium). In this series, therefore, 32 per cent. of these cases of pure nerve deafness gave a positive syphilitic reaction. It is remarkable that only 2 out of the 22 positive cases showed irritability of the vestibular labyrinth, particularly since, out of the 22 positive cases, 8 came to the hospital not for relief of their deafness, but to be relieved of dizziness and passing disturbances of equilibrium. Pilocarpine treatment was resorted to in 8 positive cases and in 10 negative cases. None of the negative cases improved, but 6 out of the positive cases were improved. He therefore recommended pilocarpine injections in syphilitic cases. (He injected $\frac{1}{10}$ cm. of a 2 per cent. pilocarpine solution; this was increased $\frac{1}{10}$ cm. when reaction (sweat, etc.) failed to appear.)

Dr. Ernst Urbantschitsch² has published an instructive paper on "The Relation of Syphilis to Deaf Mutism."

He believes that the Wassermann test will be of great service in doubtful cases in clearing up the question of luetic deafness.

He examined 129 deaf mutes from a Vienna asylum for the Wasser-

¹ Monatsschrift für Ohrenheilkunde und Laryngo-rhinologie, Band xlv, Heft 1.

² Ibid., Heft 7.

mann reaction. He also examined some of the parents when it seemed important, on account of more than one case of deaf mutism in one family. The technique followed was that of Dr. R. Müller, because it gives the surest results. Out of 129 deaf mutes, 92 showed negative reaction; 12 showed partly positive reaction; 4 showed weakly positive reaction; 8 showed medium strong, positive reaction; 8 showed almost complete positive reaction; 5 showed complete positive reaction.

In viewing the results, the partly positive and weakly positive reaction was regarded as speaking rather against than for lues, so that these cases were added to the negative ones; the medium strong reaction was regarded as speaking neither for nor against lues; the almost complete were regarded as showing probable syphilis.

Thus, we have percentage: Negative, partly, or weakly positive reaction, 86.4 per cent.; medium strong reaction, 6.4 per cent.; almost or entirely complete positive reaction, 7.2 per cent.

Even if these figures are correct, two factors must still be reckoned with under certain conditions that may change the numerical values:

1. Luetic cases may show a negative reaction, especially if they have received autoluetic treatment, and so the number of lues cases may be a higher one than the serum examination shows.

2. In proved lues, syphilis may not be the cause of the deaf mutism; it may exist besides the deaf mutism, or may only influence it. (The author tabulates 155 cases which do not.)

The critical age for the beginning of the ear affection is between eight and twelve years; children seem to be particularly disposed at this age to luetic ear diseases; often apparent congenital deaf mutism is of luetic nature.

In conclusion, the author assumes that, at times, syphilis of the parents may, by direct transference of the virus, cause deaf mutism in the children. It may also indirectly damage an otherwise transmissible germ influence, appearing, as, for instance, in some of the cited cases, in the form of an extreme neurosis.

Mr. Arthur H. Cheate,¹ at the October, 1910, meeting of the Otolological Section of the Royal Society of Medicine, read an exhaustive paper on the pathology, symptoms, and treatment of syphilis as it affects the ear.

Speaking of congenital syphilis, he remarked on the apparent changes which took place in this type by the passage from the mother to the child, as evidenced by the difference in the organs affected and their response to treatment as compared with the acquired disease.

Cheate doubted if there was evidence to prove that the disease ever caused lesions *in utero* of such a nature as to produce deaf mutism, and believed that syphilis had been overrated as a cause of deaf mutism.

¹ Abstract report by Dan McKenzie. The Journal of Laryngology, Rhinology, and Otolaryngology, vol. xxv, No. 11.

In the discussion of this point, Macleod Yearsly took issue with Cheatele, pointing to the reports of Baratoux, who, in autopsies on a number of stillborn syphilitic infants, found ear lesions, chiefly purulent middle-ear inflammations, adhesions of the membrane to the promontory, hemorrhages, and accumulations of pus in the labyrinth, and destruction of the organ of Corti. He held that while these were the only instances thus reported, they were very suggestive of the possibility of deafness before birth being caused by the disease. While he agreed that the majority of deaf mutes were produced by lesions occurring in early childhood, he most emphatically denied that syphilis as a cause for deaf mutism had been overrated. In proof of this contention, he cited the statistics of Kerr Love, of Glasgow (1.8 per cent.), Costex, of Paris (2.75 per cent.), and his own in London (3.5 per cent. in congenital cases, and 7.5 per cent. in acquired).

Cheatele's statistics showed that females were more prone to suffer from the congenital disease than males. The disease usually manifested itself from six to sixteen—it might come earlier or later. In two cases in women he had seen it come on as late as fifty-two and fifty-five years of age.

The lesions were usually found in the labyrinth. Absence of facial paralysis excluded the nerve trunk; absence of fever and headache excluded the meninges. Vertigo at the onset indicated an exudation into the labyrinth; absence of vertigo suggested the internal auditory meatus as the site of the lesion.

Other lesions, notably keratitis, were likely to immediately precede the aural attack. He laid down the general rule in diagnosis that internal ear deafness accompanied by vertigo coming on between five and twenty-five might safely be laid to syphilis when no other obvious cause was present.

TREATMENT. It was a notable fact that the usual remedies were useless. Repeated blistering, continued over a long period as originally suggested by Pritchard, had been most serviceable. Pilocarpine might be useful employed in the first three weeks.

McDonogh, in the discussion, warned the members that a congenital syphilis leads to a positive Wassermann reaction throughout the individual's life. In these circumstances, the presence of Wassermann, in a case of deafness in later life, might not necessarily mean congenital syphilitic deafness.

Vaccine Therapy. Increasing experience in the use of vaccines in suppurative conditions, according to the method of Sir Almroth Wright, seems to verify the prediction that it is of tremendous value in those cases in which the correct vaccine is used at the proper time. While occasionally the use of a stock vaccine of a certain type seems to effect a brilliant result, the really convincing reports have come from those cases in which a scientifically prepared autogenous vaccine

has been employed. It is also evident that more striking results are usually obtained in the cases where a pure culture is found in the pus than in the cases where mixed organisms are present, although a mixed vaccine of autogenous preparation is frequently very efficacious, and much more likely to be so than a mixed stock preparation.

The employment of vaccines according to the opsonic index, while scientifically accurate, is practically a very difficult matter, because the determination is so liable to be inaccurate, except in the hands of the most expert, and consequently more misleading than the clinical picture, which, generally speaking, is a safer guide. In the large majority of reported cases the vaccines have been administered without using the opsonic index as a guide, and it is fair to suppose that in some of them (particularly in acute cases, in certain phases of which the use of vaccines is clearly contraindicated) the failures may be attributed to the fact that they were improperly used.

The nature of all aural surgery—the cases being of a purulent type—makes this question a most important one to otologists. A number of important papers have appeared during the year which, with their reported cases, show a most hopeful prospect for this treatment, particularly in subacute and chronic cases.

The matter was made the subject of a joint meeting of the American Otological, American Laryngological, and American Climatological Societies during the Congress of American Physicians and Surgeons, in Washington, May 4, 1910. Dr. Henry O. Reik¹ read a most excellent résumé of the clinical reports of otological cases, and drew some interesting deductions regarding the future applicability of vaccine therapy in diseases of the ear.

He calls attention to the severe test of the measure to which otologists have subjected it by their application of it to the very worst class of cases. In many instances the reports are on cases in which all other forms of treatment had been tried for years. There are several points in which otologists may profit by considering recent work of pathologists and general surgeons:

“1. In the first place, aural infections are not infrequently mixed infections; this is particularly true of chronic purulent otitis media. As to the proper course to pursue in such cases, Ohlmacher says: ‘In a general way it may be said that a mixed infection offers a less promising outlook than that by a single bacterial species, and still some brilliantly successful results have been obtained by inoculation in very complicated and long-standing infections. Given two, or even three, bacterial species, well known as pathogenic agents, and their simultaneous appearance in the secretions of a certain lesion, it is entirely proper to inoculate with a mixed vaccine containing proper doses of

¹ The Laryngoscope, September, 1910, vol. xx, No. 9.

the offending bacteria. Or, when the urgency is not too great, inoculation with the predominating and most likely pathogenic agent is to be first performed, and, in case of unsatisfactory issue, a vaccine from the other bacterial species can be added to subsequent injections. In dealing with mixed infections of a pyogenic nature, it is necessary to follow events in the more chronic suppurations by bacteriological analyses from time to time, and to modify the inoculations to correspond with the changes of bacterial flora in the pus, in case the therapeutic response is not satisfactory.

"2. Having to deal often with long-existing localized inflammation of bone structure, we must not forget that such sinuses are frequently more or less encapsulated by inflammatory fibrous tissue, that their blood supply is poor, and that, in consequence, they are not so easily reached by remedies through the circulatory system. We have no right to expect vaccines to remove sequestra, cholesteatomatous masses, nor areas of bone necrosis. These must be removed surgically, and free drainage of sinus or abscess cavity afforded; the experience of general surgeons with stubborn abscesses and sinuses seems to indicate that the value of surgical measures may be greatly enhanced by the after-use of vaccines; in fact, that surgical treatment is saved from failure by the assistance of this additional therapy.

"3. There seems to be something for us to consider in Wright's original suggestion regarding the employment of vaccines preparatory to the introduction of surgical measures. On this point, Harris says: 'I think the study of opsonins and bacterial inoculations teaches us very clearly this fact—I mean those of us who are surgeons—that under certain conditions, particularly in tubercle, it is a wise thing to ascertain what the opsonic content is before operating, and if it is low, and if time will permit, to artificially raise it by inoculation before operating if we wish to obtain rapid healing.' There is food for thought here, and reason to hope that by following this advice we may secure a higher percentage of permanent successes in our tympanomastoid exenteration. May we not hope that, in such cases of chronic suppurative otitis media as cannot be cured by the vaccines, their use will at least bring the patient to such a condition as to insure the success of an operation.

"4. It seems to be the general consensus of opinion that the taking of the opsonic index is not an essential part of vaccine therapy, that its application requires a high degree of skill or much practice, that with anything short of absolute accuracy the results cannot be relied upon, and that, in so far as the treatment of a certain class of diseases is concerned, clinical evidences are sufficient to guide one in the use of the vaccines.

"5. That if used with reasonable care as to dosage, and especially as to asepsis, vaccine therapy is a harmless measure and carries with it practically no serious risks."

His conclusions¹ are summed up as follows:

"1. The employment of vaccine therapy in otology, although having had but a limited trial so far, has been attended by such successful results as to warrant us in feeling greatly encouraged.

"2. Furunculosis, with its recognized tendency to the formation of boils in crops, seems to have responded more promptly and satisfactorily to this form of treatment than to any other, and in tuberculosis of the middle ear, a condition hitherto so baffling to the otologist, there would seem to be good reason to believe that at last we have a controlling, curative remedy.

"3. Looking into the future, there has been held out to us the enticing prospect of being able to cure without operation a larger percentage of our cases of persistent, chronic, purulent otitis media, or, failing in that, of insuring success for the operative treatment of this affection.

"4. The aural conditions to which this new form of treatment would appear to be reasonably applicable are: The treatment of chronic suppurative otitis media; the preparation of patients for operation, raising the opsonic index in order to facilitate rapid healing after obliteration of the gross lesions; and the postoperative treatment of mastoiditis and its complications, where healing is delayed and the patient is unable to construct new tissue without aid.

"5. While the outlook is hopeful in these several directions, we must not grow too enthusiastic as yet. We are perhaps justified in some degree of optimism, but not in enthusiasm. Let us try the method further, with fairness and judiciously, not expecting the impossible of it, for it will not entirely displace any other form of treatment; no matter how valuable it ultimately becomes, it will only be an additional therapeutic measure at our command."

B. Alex. Randall, in a paper before the same joint meeting, takes a much more conservative view of the whole matter, asserting that there has not been enough cases, as yet, to warrant the enthusiasm manifested by the investigators who have reported them. The results have not been sufficiently permanent or uniform to mark a fundamental improvement in therapy to his mind; and in many instances there is a suspicion of ignorance of older methods or else too great pessimism regarding them.

He calls attention to the fact that all otologists of wide experience have witnessed the rapid improvement, under proper local treatment, of chronic cases which had previously made no progress under the alleged treatment of competent men. In the circumstances, then, the burden of proof, in his judgment, still rests with the immunizator. He says, however, that ear conditions are of the local type which ought to yield to vaccine therapy, and it may, after all, in careful hands, prove a real addition to our therapy.

¹The Laryngoscope, vol. xx, No. 9, pp. 865 to 868.

I must say that I am personally inclined, with Reik and many others, to take a most optimistic view of the prospects. I was particularly impressed with a paper of Dr. E. W. Nagle, of Boston, read at the annual meeting of the American Laryngological, Rhinological, and Otological Society, in Washington. Her work had been largely with chronic cases of otitis. Forty cases were reported; 34 of these had a suppurative otitis lasting from one to forty years, while 6 had suffered for a few months. Of these 40, 39 were cured, the only one not responding being one of the more acute cases. Dr. Nagle employed an autogenous vaccine very carefully prepared. Great stress was laid on the importance of killing the bacteria by the lowest temperature applied for the shortest interval by which it could be accomplished. They were administered at shorter intervals than have usually been allowed by other investigators, and the time was determined by clinical observations rather than by the opsonic index. The report was verified by Dr. Cobb, who had sent many of the cases to Dr. Nagle.

Dr. Frederic E. Sondern believed with Dr. Nagle that the high value of her vaccines had been due to their careful preparation, particularly in the point mentioned of killing them at as low a temperature as possible.

While these were all in chronic cases, Dr. Ewing W. Day, of Pittsburg, in the discussion, mentioned six cases of acute streptococcic infection in which he had employed vaccines, with excellent results.

Dr. James F. McKernon¹ reported the use of autogenous vaccines in operated cases of mastoiditis occurring in scarlatina and measles. The resulting wound repair was most satisfactory. In such cases complete healing took place at shorter intervals than usual. It is a well-known fact that mastoid wounds in acute infectious diseases are prone to slow recovery. McKernon believes that we have in the autogenous vaccines prepared from cultures of such cases a valuable aid to wound repair.

¹Transactions of the American Laryngological, Rhinological, and Otological Society, 1910.

INDEX

A

ABSCCESS, retropharyngeal, 298
 Accessory breasts, 108
 sinuses, 285
 Acoustic nerve, 62
 tumors of, 62
 Actinomycosis, 122
 of cheek, 24
 intralaryngeal, 314
 of larynx, 25
 of neck, 24
 of orbit, 25
 of tongue, 25
 serodiagnosis of sporotrichosis and, 190
 Adamantinoma of jaws, 22
 Adenitis, tuberculous, 29
 cervical, 210
 treatment of, by Röntgen rays, 204
 treatment of, 30
 x-ray, 35
 Adenoids, prevalence of, 300
 African tick fever, transmission of, 196
 After-treatment of sinus operations, 292
 Air embolism, 101
 passages, upper, diagnosis of syphilitic lesions of, 283
 Albumin milk, 268
 Alcohol injections into superior laryngeal nerve in treatment of dysphagia of laryngeal tuberculosis, 315
 Alum baths in typhoid fever, 231
 Amebic dysentery, 141
 Amebiform protozoan, infection of still-born infant with, 122
 Amusia, relation of stuttering to, 319
 Anaphylactic reaction, cutaneous, as a contraindication to diphtheria antitoxin, 140
 Anemic ulcers of throat, 298
 Aneurysm of internal carotid, arteriorrhaphy for, 41
 Animals, susceptibility of, to plague, 160
 Anomalous scarlet fever, 183
 Antiseptics in treatment of cholera, 131
 Antithyroid serum in exophthalmic goitre, 44
 Antitoxin, diphtheria, 138
 effect of, on menstruation, 141
 intramuscular injections of, 141
 intravenous injections of, 141
 Antityphoid vaccination in treatment of typhoid fever, 234

Anuria, postscarlatinal, 184
 Aphonia, faradic current in, 317
 hysterical, treatment of, 318
 Artificial feeding, 262
 caloric method of, 262
 Arterial anastomosis, direct, in hemorrhagic disease in newborn, 248
 Arteriorrhaphy for aneurysm of internal carotid, 41
 Arthritis, influenzal, 147¹
 tuberculous, simulating rheumatism, 210
 Ascarides lumbricoides, intestinal obstruction from, 123
 Asthenic pneumonia, 163
 Atlas, traumatic lesions of, 36
 Atmosphere, bacterial pollution of, by mouth spray, 118
 Axis, traumatic lesions of, 36

B

BACILLUS, diphtheria, simplified method of staining, 139
 lactic acid, in infant feeding, 265
 influenza, in cholecystitis, 146
 leprosy, cultivation of, 147
 new, in typhus fever, 237
 of whooping cough in blood, 241
 Bacterial pollution of atmosphere by mouth spray, 118
 Bacteriology of rhinitis, 280
 of tonsils, 301
 Balantidium coli infection in man, 124
 of tonsils, 301
 Balantidium coli infection in man, 124
 Beranek's tuberculin, 217
 Bilharzia hematobia in Egyptian mummies, 126
 Bilharziasis, 125
 diagnosis of, 126
 treatment of, 126
 Bleeding polypus of turbinate, 283
 Blood, bacillus of whooping cough in, 241
 cultures in pneumonia, 162
 in typhoid fever, value of, 228
 examination in exophthalmic goitre, 47
 pressure in cerebrospinal fever, 126
 serum injections in hemorrhagic disease in newborn, 249
 in stools in infancy, 271
 Bordet-Gengou phenomenon in tuberculosis, 201

Brain, 57
 puncture of, 83
 tumors, 57
 with exophthalmos, 59

Breasts, accessory, 108
 cancer of, 105
 serratus magnus invasion in, 107
 carcinoma of, and tuberculosis, 109
 feeding, 260
 hypertrophy of, 108
 relation of size of, to tuberculosis, 212

Bronchitis due to Vincent's streptothrix, 239

Bundle of His in diphtheria, 136

C

CALORIC method of artificial feeding, 262

Cancer. *See* Carcinoma.

Carcinoma of breast, 105
 Röntgen therapy in, 108
 serratus magnus invasion in, 107
 tuberculosis and, 109
 of face 20
 of lip, 26
 of esophagus, 101
 of scalp, 20

Cardiac massage, 91

Cardiolysis, 88

Catching cold, 280

Cats as plague preventers, 161

Cavernous hemangioma, 40

Cerebellum, tumors of, 60

Cerebral hemorrhage, 61

Cerebrospinal fever, 126
 blood pressure in, 126

Cervical rib, 28
 sympathectomy of exophthalmic goitre, 53

Cheek, actinomycosis of, 24

Childhood, enuresis in, 252
 indicanuria in, 251
 treatment of, 252

pyelitis in, 252

Children, diseases of, 245
 school, as typhoid carriers, 221
 typhoid fever in, 223

Choked disk with blindness, in whooping cough, cured by trephining, 241

Cholecystitis, influenza bacillus in, 146

Cholera, 127
 fish as carriers of, 127
 management of campaign against, 127
 prophylaxis of, 130
 thymol in, 130
 at St. Petersburg, 132
 treatment of, 130
 antiseptics in, 131
 hypertonic salt solution in, 130
 serum therapy in, 132

Chloroma of jaws, 23

Chondrotomy, 96

Chorea, nasopharyngeal origin of, 299

Chronic cystic mastitis, 105
 nasal diphtheria, 282

Citric acid feeding in infants, 267

Class method of treatment of tuberculosis, 215

Colds, common, 133

Colloid chemical aspect of digestion, 274

Complications of tonsil and adenoid operations, 306

Congenital deformity of nose, 277
 fistula of lip, 26
 insufficiency of palate, 294
 malaria, 151

Contagion by inhalation, plugging nostrils to prevent, 277

Cordectomy for bilateral abductor paralysis, 316

Cranial nerves, 61

Cultivation of leprosy bacillus, 147

Curds in stools in infancy, 271
 significance of, 273

Cutaneous myiasis in the Congo, 154

Cysticercus, treatment of, by male fern, 134

Cysts of jaws, 22

D

DANGER of tuberculosis in milk, 258

Deaf-mutism, 321

Delhi sore, 135

Dementia praecox, partial thyroidectomy in, 43

Dentigerous cyst of jaws, 22

Depressed fracture of malar bone, 20

Differential pressure in empyema, 96

Digestion, colloid chemical aspect of, 274

Diphtheria, 135
 antitoxin, 138
 cutaneous anaphylactic reaction as a contraindication to, 140
 effect of, on menstruation, 141
 intravenous and intramuscular injections of, 141
 bacilli, simplified method for staining, 139
 bundle of His in, 136
 carriers in public schools, 137
 nasal, chronic, 282
 primary, of external urinary meatus, 136
 toxin, diffusion of, in body, 139
 in young infants, 135

Direct intubation of larynx, 309

Disease of children, 243
 common drinking cup in transmission of, 118
 echinococcus, 143
 hookworm, 144
 treatment of, 145
 infectious, rickets as, 181
 soamin in, 121
 of neck, malignant, 36
 of nose malignant, 284
 street dust as factor in spreading, 117
 of tongue, malignant, 27

Dislocation of a cervical vertebra, 39

Disturbances in upper air passages with leukemia and pseudoleukemia, 296

Diverticula, esophageal, 103
 Drinking cup, common, in transmission of disease, 118
 Dwarf tapeworm, 192
 Dysentery, amebic, 141
 prevalence of, 142
 treatment of, 142
 ipecaac in, 142
 Dysmenorrhea and tuberculosis, 214
 Dyspnea due to tuberculous mediastinitis, 212

E

EAR, suppurative conditions of, vaccine in, 342
 Echinococcus disease, 143
 serum diagnosis cf, 143
 Edema neonatorum, 250
 treatment of, 250
 Effect of tobacco on nose and throat, 278
 Embolism, air, 101
 Empyema, 91
 differential pressure in, 96
 Enteritis, trichocephalus, 198
 Enucleation of tonsils, 304
 Enuresis in children, 252
 treatment of, 253
 Eosinophilia, relation of helminthic infection to, 120
 Epidemic generalized vaccinia, 239
 Epilepsy, 81
 Epistaxis in cerebrospinal meningitis, 279
 treatment of, 279
 Epulis of jaw, 21
 Eruption in typhoid fever, causes determining production and distribution of, 227
 Erythema, postscarlatinal, 184
 Esophageal diverticula, 103
 Esophagus, 101
 cancer of, 101
 stricture of, 104
 Eustachian tube, 337
 Exophthalmic goitre, 44
 antithyroid serum in treatment of, 44
 blood examination in, 47
 cervical sympathectomy in, 53
 medical treatment of, 49
 neuropathological cytology of, 53
 operative interference in, 48
 postoperative results in, 52
 Exophthalmos, pulsating, ligation of internal carotid for, 42
 Experimental researches upon relation between shock and infection, 120
 typhoid fever, 219
 yaws, 242

F

FACE, 17
 carcinoma of, 20
 Facial palsy, 61

Faradic current in aphonia, 317
 Fat percentage in infant feeding, regulation of, 268
 indigested, in stools in infancy, 272
 Feces, tubercle bacilli in, 208
 Feeding, artificial, 262
 caloric method of, 262
 breast, 260
 infant, citric acid, 267
 lactic acid bacilli in, 265
 regulation of fat percentage in, 268
 Fever, hookworm, 145
 Malta, 151
 Filaria, 143
 Filariasis, relation of mosquitoes to, 144
 Fish as carriers of cholera spirilla, 137
 Fistula of lip, congenital, 26
 parotid, 19
 Food, milk as infant, 256
 Fourth of July tetanus, 193
 Fracture, mandibular, treatment of, 20
 of nose, 278
 of skull, 79

G

GERMAN measles, 152
 Gland, mammary, 105
 thyroid, 43
 Glanders bacillus, virulence of old cultures of, 144
 Goitre, exophthalmic, 44
 antithyroid serum in, 44
 blood examination in, 47
 cervical sympathectomy in, 53
 medical treatment of, 49
 neuropathological cytology of, 53
 operative interference in, 48
 postoperative results in, 52
 hemorrhages in, 43
 vocal cords in, 311

H

HEAD, surgery of, 17
 Health, public, rat in relation to, 119
 Heart, 84
 massage of, 91
 muscle in typhoid fever, 224
 wounds of, 84
 Helminthic infection, relation of, to eosinophilia, 120
 Hemangioma, cavernous, 40
 Hemophilia neonatorum, 248
 Hemorrhage, cerebral, 61
 in goitres, 43
 Hemorrhagic disease in newborn, 248
 Hernia of lungs, 90
 Hexaethylenamine in sinus suppuration, 293
 His, bundle of, in diphtheria, 136
 Hookworm disease, 144
 infantilism in, 146

Hookworm disease, treatment of, 145
 fever, 145
 Hospital infection of tuberculosis, 206
 Hydrocephalus, 73
 methods of treating, 74
 Hyperthermia, 63
 Hypertonic salt solution in treatment of
 cholera, 130
 Hypertrophy of breast, 108
 Hypophysis, 64
 relation of acromegaly to, 64
 tumors of, 65
 Hysterical aphonia, treatment of, 318

I

IMMUNITY from poliomyelitis, 169
 Improved technique for paraffin injections, 282
 Incubation period of poliomyelitis, 170
 Indicanuria in infancy and childhood, 251
 treatment of, 252
 Infancy and childhood, urine in, 251
 indicanuria in, 251
 treatment of, 252
 stools in, 268
 abnormalities of color of, 270
 blood in, 271
 curds in, 271
 significance of, 273
 membrane in, 272
 mucus in, 271
 pus in, 271
 undigested fat in, 272
 Infant mortality, 245
 Infantilism in hookworm disease, 146
 Infants, premature, 255
 young, diphtheria in, 135
 Infection, *balantidium coli*, in man, 124
 of stillborn infant with amebiform
 protozoan, 122
 Infectious diseases, 111
 soamin in, 121
 Inflammation of sinus maxillaris, 286
 summary of microscopic
 findings in, 287
 Influenza bacillus in cholecystitis, 146
 Influenzal arthritis, 147
 meningitis, 146
 Initial hemorrhagic exanthem in typhoid
 fever, 227
 Inoculation experiments in poliomyelitis,
 177
 Insufflation, intratracheal, 92
 Intestinal obstruction from *ascarides lum-*
 bricoides, 123
 Intracranial syphilis, 61
 Intralaryngeal actinomycosis, 314
 Intratracheal insufflation, 92
 Intubation of larynx, direct, 309
 Ipecac in treatment of intestinal amebi-
 asis, 142

J

JAUNDICE in newborn, 250
 Jaws, 20

Jaws, adamantinoma of, 22
 chloroma of, 23
 cysts of, 22
 dentigerous, 22
 epulis of, 21
 sarcoma of, 21
 tumors of, 21
 treatment of, 21
 Jews, tuberculosis among, 208

L

LABYRINTHITIS, suppurative, 329
 course of, 336
 prognosis, 330, 336
 treatment of, operative, 331
 indications for, 334
 method, 332
 Lacrymal gland tumors, 18
 Lactic acid bacilli in infant feeding, 265
 Laryngeal tuberculosis, course of, with
 artificially induced pneumothorax, 315
 Larynx, 309
 actinomycosis of, 25
 direct intubation of, 309
 and trachea, Vincent's angina of, 313
 Leprosy, 147
 bacillus, cultivation of, 147
 diagnosis of, 147
 Leukemia and pseudoleukemia, dis-
 turbances in upper air passages with,
 296
 Ligation of internal carotid for pulsating
 exophthalmos, 42
 Lip, carcinoma of, 26
 fistula of, congenital, 26
 tuberculosis of, 26
 Localized tetanus, 194
 Lungs, 89
 hernia of, 90
 resection under both forms of differ-
 ential pressure, 97
 wounds of, 89

M

MALAR bone, depressed fracture of, 20
 Malaria, 148
 congenital, 151
 massage of spleen in latent, 151
 recent researches in, 148
 Malarial fever during puerperium, 151
 Male fern in treatment of cysticercus, 134
 Malignant disease of neck, 36
 of nose, 284
 of tongue, 27
 Malta fever, 151
 in United States, 152
 Mammary gland, 105
 Management of cholera campaign, 137
 Massage, cardiac, 91
 of spleen in latent malaria, 151
 Mastitis, chronic cystic, 105
 Measles, German, 152

- Measles, swelling of lymph nodes in incubation period of, 152
 Mediastinal tumors, 100
 Mediastinitis, tuberculous, dyspnea due to, 212
 Meistagmin reaction, 115
 Melæna neonatorum, 248
 Membrane in stools in infancy, 272
 Meningitis, 78
 cerebrospinal, epistaxis in, 279
 influenzal, 146
 otitic, 327
 paratyphoid, 158
 tuberculous, localized, with symptoms of cerebrospinal, 214
 maternal nursing and, 214
 Meningococcus carriers, 155
 Menstruation and typhoid fever, 225
 Mexican typhus, 190
 Milk, albumin, 268
 as infant food, 256
 pasteurized, 257
 tuberculosis in, danger of, 258
 Mortality, infant, 245
 Mosquitoes, relation of, to filariasis, 144
 Mouth, 26
 spray, bacterial pollution of atmosphere by, 118
 Mucus in stools in infancy, 271
 Muscular rigidity and light touch palpation, 200
 Myiasis, 154
 cutaneous, in the Congo, 154
 of rectum, 154
- N**
- NASAL diphtheria, chronic, 282
 neuroses, reflex, 285
 Nasopharyngeal origin of chorea, 299
 Neck, 28
 actinomycosis of, 24
 malignant disease of, 36
 surgery of, 17
 Nephritis following tonsillitis, 303
 Nerve, acoustic, 62
 cranial, 61
 Neuralgia, trigeminal, 75
 and functional disturbances from tonsil infections, 303
 Neuropathological cytology of exophthalmic goitre, 53
 Neuroses, reflex nasal, 285
 Newborn, hemorrhagic disease of, 248
 treatment of, 248
 direct arterial anastomosis in, 248
 jaundice in, 250
 loss of weight in, 248
 septic infection in, 250
 Nose, 277
 congenital deformity of, 277
 fracture of, 278
 malignant disease of, 284
 polypoid[sarcoma of, 284
 syphilitic deformities of, 17
 and throat, effect of tobacco on, 278
- Nurslings, transmission of typhoid fever by, 221
- O**
- OPERATIONS, sinus, after-treatment of, 292
 Operative interference in exophthalmic goitre, 48
 Orbit, actinomycosis of, 25]
 Otitic meningitis, 327
 Otitis media, acute and chronic, vaccines in, 238
 Otology, 321
- P**
- PALATE, congenital insufficiency of, 294
 Palsy, facial, 61
 Paraffin injections, improved technique for, 282
 Paralysis, bilateral abductor, corpectomy for, 316
 in poliomyelitis, 174
 Parameba hominis, 155
 Parathyroids, 56
 Paratyphoid A infection in sucklings, 158
 B, typhoid and, mixed infections of, 237
 fever, 155
 epidemic of, 157
 meningitis in, 158
 and public health, 158
 Parotid fistula, 19
 Parotitis, postoperative, 19
 Partial thyroidectomy in dementia præcox, 43
 Pasteurized milk, 257
 Pellagra, 159
 cause of, 159
 transmission of, 159
 Peptic ulcer, 103
 Periostitis, typhoid, eighteen years after primary attack, 225
 Pharynx, 294
 rupture of vessels of neck into, in scarlet fever, 298
 Piroplasmosis, 159
 Pituitary gland, tumors of, 65
 operations upon, technique of, 65
 Plague, 160
 preventers, cats as, 161
 susceptibility of animals to, 160
 treatment of, 161
 Plugging nostrils to prevent contagion by inhalation, 277
 Pneumococcus septicæmia and hemoglobinuria, 162
 Pneumonia, 162
 asthenic, 163
 atypical, 163
 blood cultures in, 162
 postoperative, 164
 traumatic, 162
 Pneumothorax, therapeutic, 99
 Poliomyelitis, 165

- Poliomyelitis, diagnosis of, 176
 frequency of, 170
 immunity in, 169
 incubation period of, 170
 inoculation experiments in, 167
 occurrence of, 170
 age in, 172
 food in, 173
 race in, 172
 relation of insects to, 171
 sex in, 172
 paralysis in, 174
 pathological anatomy in, 168
 possibility of second attacks, 169
 prodromata of, 173
 reference of, to paralysis in animals, 170
 reflexes in, 175
 relation of, to other diseases, 173
 skin eruptions in, 174
 symptoms of, 173
 transmissibility of, 166
 treatment of, 177
 vasomotor disturbances in, 175
 Wickman's classification of, 176
 Polypoid sarcoma of nose, 284
 Polypus of turbinate bleeding, 283
 Porocephalasis in man, 178
 Postoperative parotitis, 19
 pneumonia, 164
 Postscarlatinal anuria, 184
 erythema, 184
 Potassium permanganate bandages in
 treatment of smallpox, 188
 Premature infants, 255
 Prevalence of adenoids, 300
 Primary diphtheria of external urinary
 meatus, 136
 Prophylaxis of cholera, 130
 thymol in, 130
 Public health, paratyphoid and, 158
 schools, diphtheria carriers in, 137
 Puerperium, malarial fever during, 151
 Puncture of brain, 83
 Pupils, unequal reaction of, as early sign
 of pulmonary tuberculosis, 211
 Purification of water supplies, and de-
 crease in mortality of, 115
 Pus in stools in infancy, 271
 Pustular rose spots in typhoid fever, 228
 Pyelitis in children, 252

R

- RUBIES, 178
 in the Philippines, 180
 Wassermann reaction in, 180
 Rachitis, 275
 Rat in relation to public health, 119
 Reaction, meiotagmin, 115
 Rectum, myiasis of, 154
 Recurrent fever, transmission of, 180
 Reflex nasal neuroses, 285
 in poliomyelitis, 175
 Relation of helminthic infection to eosino-
 philia, 120

- Relation of stuttering to amusia, 319
 Retropharyngeal abscess, 298
 Rheumatism, acute, sodium salicylate in-
 jections in treatment of, 181
 tuberculous arthritis simulating, 210
 Rhinitis, atrophic, treatment of, 281
 bacteriology of, 280
 Rib, cervical, 28
 Rickets as an infectious disease, 181
 Ringworm, 182
 Röntgen therapy in carcinoma of breast,
 108
 Rocky Mountain spotted fever, relation of
 tabardillo to, 191
 Rose spots, pustular, in typhoid fever, 228
 Rupture of vessels of neck into pharynx
 in scarlet fever, 298

S

- SALINE instillation, continuous, in treat-
 ment of typhoid fever, 232
 Salt solution, hypertonic, in treatment of
 cholera, 130
 Sarcoma of jaw, 21
 of nose, polypoid, 284
 Scalp, carcinoma of, 20
 Scarlet fever, 183
 anomalous, 183
 rupture of vessels of neck into
 pharynx in, 298
 serum treatment of, 185
 School children as typhoid carriers, 221
 Sclerema neonatorum, 250
 Septic infection in newborn, 250
 Serodiagnosis of sporotrichosis and of ac-
 tinomycosis, 190
 of syphilis, 115
 Serratus magnus invasion in carcinoma of
 breast, 107
 Serum diagnosis of the echinococcus, 143
 human blood, in hemorrhagic disease
 in newborn, 249
 therapy in cholera, 132
 treatment of scarlet fever, 185
 Shock and infection, experimental re-
 searches upon relation between, 120
 Sigmoid sinus, thrombosis 338
 Sinus, accessory, 285
 inflammation of, 287
 cause of death from, 291
 disease, chronic, vaccine therapy in,
 293
 maxillaris, inflammation of, 286
 operations, after-treatment of, 292
 suppuration, hexamethylenamine in,
 293
 Skin eruptions in poliomyelitis, 174
 rashes in typhoid fever, 225
 Skull, fractures of, 79
 Sleeping sickness, 186
 excessive liability of European
 women in Africa to, 187
 treatment of, 187
 Smallpox, 188

- Smallpox, bandages of potassium permanganate in treatment of, 188
 red light in, use of, 188
- Soamin in infectious diseases, 121
- Sodium salicylate injections in treatment of acute rheumatism, 181
- Sore, Delhi, 135
- Spleen, massage of, in latent malaria, 151
- Sporotrichosis, 189
 serodiagnosis of, and of actinomycosis, 190
- Sputum of typhoid fever patients as source of infection, 222
- Status lymphaticus, 254
 with autopsy, 54
 x-ray treatment of, 56, 255
- Stools in infancy, 268
 abnormalities of color of, 270
 blood in, 271
 curds in, 271
 significance of, 273
 membrane in, 272
 mucus in, 271
 pus in, 271
 undigested fat in, 272
- Street dust as factor in spreading disease, 117
 methods of removal, 117
- Stricture of esophagus, 104
- Suppurative labyrinthitis, 329
 otitis, vaccines in, 342
- Surgery of head, 17
 of neck, 17
 of thorax, 17
- Susceptibility of animals to plague, 160
- Swelling of lymph nodes in incubation period of measles, 152
- Syphilis in ear disease, 340
 treatment of, 342
 intracranial, 61
 serodiagnosis of, 115
- Syphilitic deformities of nose, 17
 lesions of upper air passages, diagnosis of, 283
- Syphilitics, tuberculin reaction in, 215
- T**
- TABARDILLO, 190
 relation of, to Rocky Mountain spotted fever, 191
- Tapeworm, dwarf, 192
- Temperature curve in pulmonary tuberculosis, 211
- Tetanus, 193
 Fourth of July, 1933
 localized, 194
 treatment of, 194
 Baccelli's method of, 195
- Therapeutic dislocation of hypertrophied thyroid, 44
 pneumothorax, 99
- Thorax, surgery of, 17
- Throat, anemic ulcers of, 298
- Thrombosis, sigmoid sinus, 338
- Thymol in prophylaxis of cholera, 130
- Thymus gland, 53
 experimental removal of, 54
 from surgical standpoint, 55
- Thyroid gland, 43
 hypertrophied, therapeutic dislocation of, 44
 syphilis of, 43
- Thyroidectomy, partial, in dementia praecox, 43
- Tongue, 27
 actinomycosis of, 25
 malignant disease of, 27
- Tonsils, 301
 and adenoid operations, complications of, 306
 bacteriology of, 301
 enucleation of, 304
 infections of, neuralgias and functional disturbances from, 303
 tuberculosis of, 304
- Tonsillitis, nephritis following, 303
- Toxin, diphtheria, diffusion of, in body, 139
- Tracheotomy, transverse, 317
- Trachoma, 196
- Transmissibility of poliomyelitis, 176
- Transmission of African tick fever, 196
 of European typhus fever, 238
 of recurrent fever, 180
- Transverse tracheotomy, 317
- Traumatic lesions of atlas and axis, 36
 pneumonia, 162
 tuberculosis, 204
- Treatment of amebic dysentery, 142
 ipecac in, 142
 of atrophic rhinitis, 281
 of bilharziasis, 126
 of cholera, 130
 antiseptics in, 131
 serum therapy in, 132
 of cysticercus by male fern, 134
 of dysphagia of laryngeal tuberculosis, 315
 of edema neonatorum, 250
 of enuresis, 253
 of epistaxis, 279
 of hemorrhagic disease in newborn, 248
 of hookworm disease, 145
 of hydrocephalus, 74
 of hysterical aphonia, 318
 of mandibular fractures, 20
 medical, in exophthalmic goitre, 49
 of plague, 161
 of poliomyelitis, 177
 of sclerema neonatorum, 250
 of sleeping sickness, 187
 of smallpox, 188
 potassium permanganate bandages in, 188
 red light in, use of, 188
 of tetanus, 194
 Baccelli's method of, 195
 of tuberculous adenitis, 30
 cervical, by Röntgen rays, 204
 by x-rays, 35

- Treatment of tumors of jaw, 21
 of typhoid fever in children by continuous saline instillation, 232
 turpentine enemata in, 233
 vaccines in, 237
- Trichinosis, 196
 and examination of blood, 197
- Trichocephalus enteritis, 198
- Trigeminal neuralgia, 75
- Trypanosomiasis, 198
- Tubercle bacillus, differential characteristics of human and bovine types of, 218
 in feces, 208
- Tuberculin, Beranek's, 217
 reaction in syphilitics, 215
 von Pirquet's, 217
- Tuberculosis, 198
 Bordet-Gengou phenomenon in, 201
 and carcinoma of breast, 109
 dysmenorrhea and, 214
 hospital infection of, 206
 among Jews, 208
 laryngeal, course of, with artificially induced pneumothorax, 315
 treatment of dysphagia of, 315
 of lungs without cough or expectoration, 209
 of lip, 26
 in milk, danger of, 258
 new methods of examining for tubercle bacilli, 198
 in old people, 209
 pulmonary temperature curve in, 211
 unequal reaction of pupils to light as an early sign of, 211
 relation of size of breast to, 212
 of tonsils, 304
 traumatic, 204
 travelling car exhibits, use of, in, 216
 treatment of, class method of, 215
 variations of temperature during menstrual period in, 213
 x-rays in, use of, 202
- Tuberculous adenitis, 29
 arthritis simulating rheumatism, 210
 cervical adenitis, 210
 infection laundries, 207
 mediastinitis, dyspnea due to, 212
 meningitis, localized, with symptoms of cerebrospinal meningitis, 214
 maternal nursing and, 214
- Tumors of acoustic nerve, 62
 brain, 57
 with exophthalmos, 59
 of cerebellum, 60
 of jaw, 21
 lacrimal gland, 18
 mediastinal, 100
 of pituitary gland, 65
- Turbinate, bleeding polypus of, 283
- Turpentine enemata in treatment of typhoid fever, 233
- Typhoid bacilli, influence of potassium iodide and arsenous acid on, 234
 carriers, 221
- Typhoid carriers, school children as, 221
 fever, 219
 alum baths in, 231
 blood cultures in, value of, 228
 causes determining production and distribution of eruptions in, 227
 in children, 223
 treatment of, 223
 diagnosis of, new, simple method of, 230
 etiology of, 220
 experimental, 219
 heart muscle in, 224
 menstruation and, 225
 initial hemorrhagic exanthem in, 227
 pustular rose spots in, 228
 skin rashes, 225
 sputum of patients as source of infection in, 222
 transmission of, by nurslings, 221
 treatment of, antityphoid vaccination in, 234
 by continuous saline instillation, 232
 turpentine enemata in, 233
 vaccines in, 237
 ulcer of soft palate in, 224
 water filtration and, 220
 and paratyphoid B, mixed infections of, 237
 periostitis eighteen years after primary attack, 225
- Typhus fever, 237
 European, transmission of, 238
 new bacillus in, 237
 Mexican, 190
 relation of, to Rocky Mountain spotted fever, 191

U

- ULCER, peptic, 103
 of soft palate in typhoid fever, 224
 of throat, anemic, 298
- Undigested fat in stools in infancy, 272
- Urinary meatus, external, primary diphtheria of, 136
- Urine in infancy and childhood, 251

V

- VACCINE in acute and chronic otitis media, 238
 therapy in chronic sinus disease, 293
 in treatment of typhoid fever, 237
- Vaccinia, epidemic generalized, 239
- Vasomotor disturbances in poliomyelitis, 175
- Vertebra, cervical, dislocation of, 39
- Vincent's angina of larynx and trachea, 313
 streptothrix, bronchitis due to, 239

- Virulence of old cultures of glanders bacillus, 144
 Vocal cords in goitre, 311
 von Pirquet's tuberculin reaction, 217

- Wickman's classification of poliomyelitis, 176
 Wounds of heart, 84
 of lungs, 89

W

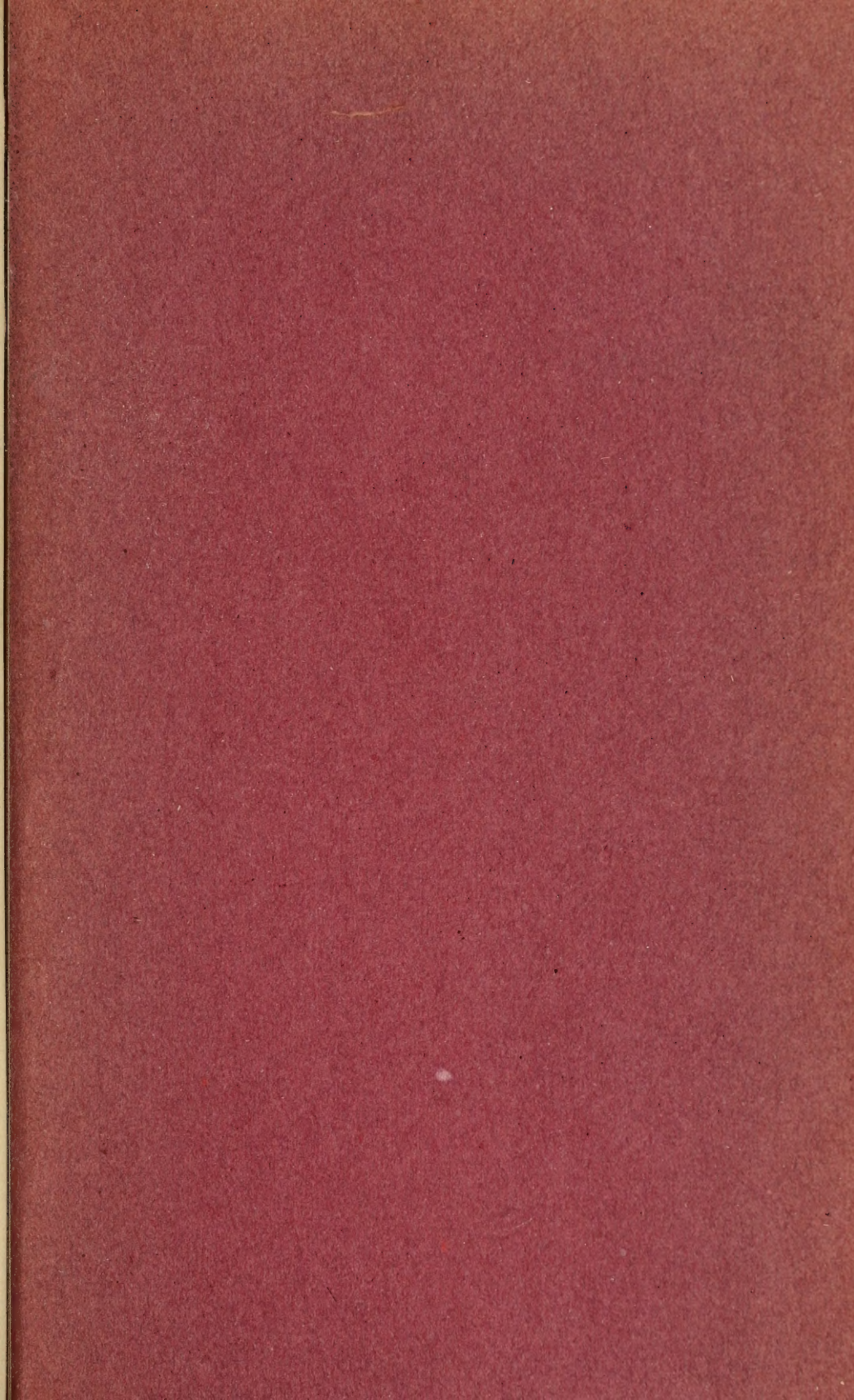
- WASSERMANN reaction in rabies, 180
 Water filtration and typhoid fever, 220
 supplies, purification of, 116
 Weight, loss of, in newborn, 248
 Whooping cough, 240
 bacillus of, in blood, 241
 choked disk with blindness in,
 cured by trephining, 241

X

- X-RAY treatment of status lymphaticus, 54, 255
 of tuberculous adenitis, 35
 in tuberculosis, use of, 202

Y

- YAWS, experimental, 242
 Yellow fever, 243



University of Toronto

Biological Library
& Medical _____
Serials

**DO NOT
REMOVE
THE
CARD
FROM
THIS
POCKET**

Acme Library Card Pocket
Under Pat. "Ref. Index File"
Made by LIBRARY BUREAU

